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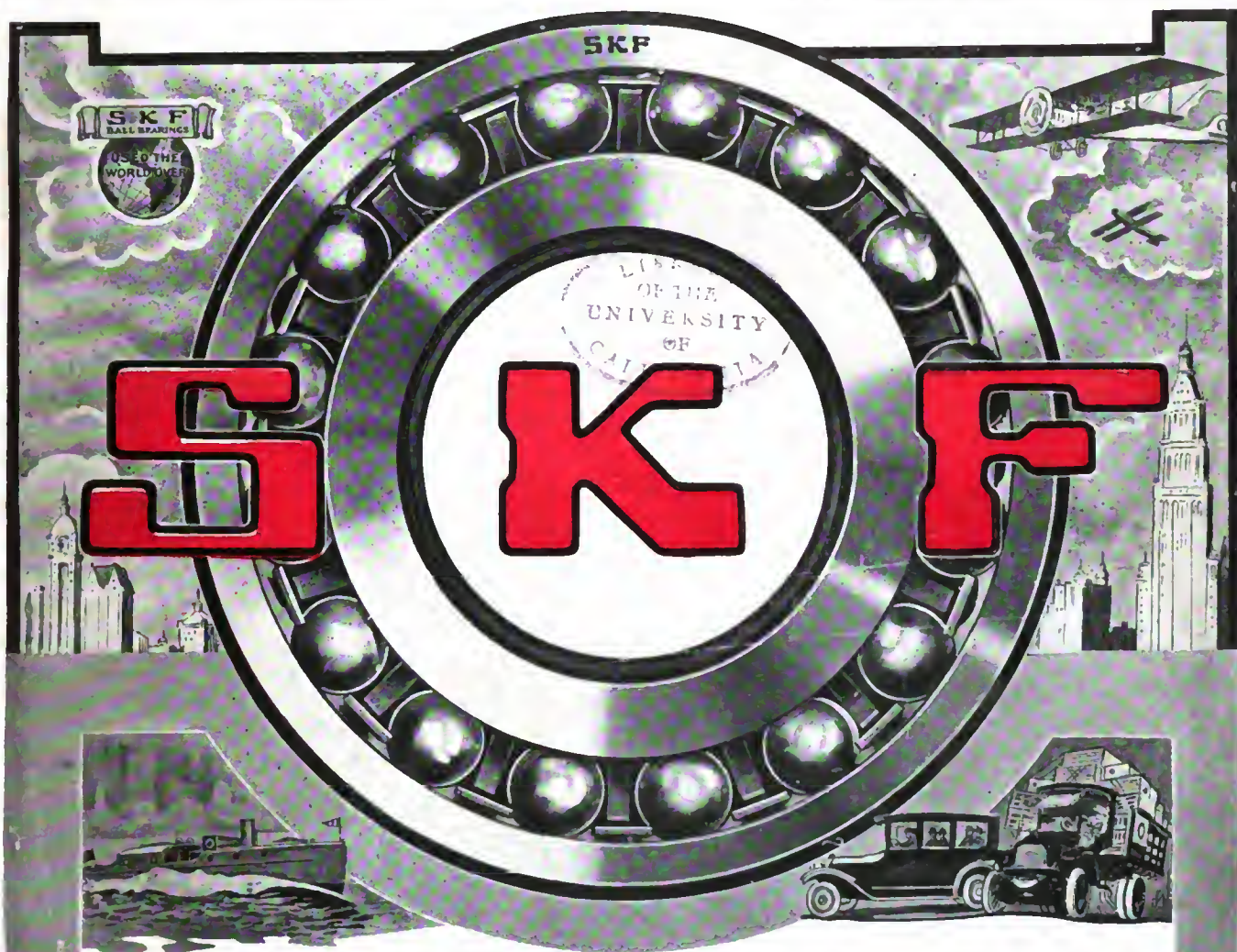
The MOTOR TRUCK

Devoted to Power Vehicles, Conversion Units and Farm and Road Tractors

ol. IX.

PAWTUCKET, R. I. JANUARY, 1918

No. 1



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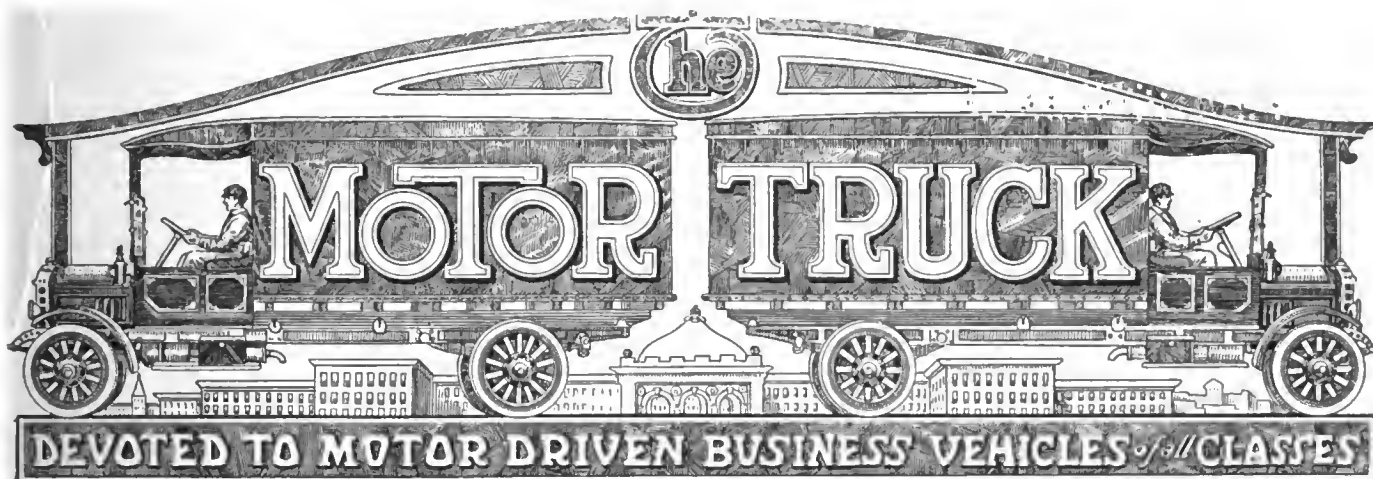
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Vol. IX. No. 1.

PAWTUCKET, R. I.

JANUARY, 1918

ONLY RELIEF FOR BUSINESS IS HIGHWAY HAULAGE

Motor Truck's Plan Will Avert National Disaster

Coordination of All Commercial and Industrial Bodies Will Obviate Largely Independent Operation of Road Traffic, Minimize Duplication of Service, Reduce Terminal Congestion and Expedite Shipments of a Large Part of Freights of Railroad and Water Lines

RAILROAD transportation has reached a degree of congestion that only the operation of power trucks in very large numbers, and as nearly continuously as is possible, will afford relief.

The conditions were forecasted and suggestions were made for the use of trucks, but instead of a practical plan being determined and developed, nothing whatever has been done, and now the railroads are simply swamped with the demands upon them for supplying fuel.

There is every reason to believe that the necessity of supplying fuel and food will force

the abandonment of all other regular services, and until these needs (which must be met to avert actual suffering from cold and hunger) have been supplied all else, even the production of war munitions, must be secondary.

As great as are the resources of the railroads they

are absolutely inadequate to the transportation requirements of the country. First operated independently and in competition, then directed by a joint board as one system, and now controlled by the government, conditions have become worse, each day the congestion



Class B Truck, Capacity 6000 Pounds, Now Being Built as Standard Equipment for the United States Army, to Be Driven to Shipping Ports on Highways.



Five-Ton Truck Equipped with Hydraulic Hoist, and Body That Can Be Used Open or with a Removable Top—A Specially Desirable Type for Highway Freightage.

has increased and relief will be the more difficult to obtain.

The fuel demand is to be met by first supplying householders, and then in order public service corporations, shipping to the Allies and the American army abroad, industries making war munitions, and last the other industries. Food must be transported wherever there is need. After these demands have been supplied the other classifications of freight, raw materials and finished products, must be handled.

Statements have been made that embargo would be placed on "non-essentials," but just what constitutes this class of products is far from clear. There is no recognized standard by which to measure the economic value of any product and there is the prospect of serious business disruption.

Highway Transport the Only Relief.

There will be at least two more months of winter weather. During that time the products of the industries will be enormously retarded. Then with the coming of spring will be a very large need of fuel, food must be distributed, materials and manufactured goods must be moved, the thousands upon thousands of tons of war munitions and supplies must be sent abroad. No one can comprehend the results of the retardation of industry. No one can forecast what conditions and situations will obtain. Every one will admit that unless the American troops abroad are well supplied and equipped they will not be ready to take part in the operations that may possibly decide the outcome of the war.

Whether or not the condition is realized, there is no doubt that in no small measure the war is being waged on the railroads and the highways of America, and if we depend upon the railroads entirely we are making the greatest of all blunders. And it is a blunder that is entirely unnecessary.

There is but one certain form of relief, and that is to systematically establish and operate highway transportation wherever this will release railroad cars and trackage. To leave this to individual initiative is suicidal, because if this is done there will be neither co-ordination nor cooperation, and the transport available will be so absolutely inadequate that it will not

be a relief. This is no time for temporizing. The condition is not only serious, but is critical, and what shall be done must be done quickly. No matter how efficient an organization may be planned, nor how great its resources, time will be necessary to establish operating companies and obtain equipment.

There is one condition that has not been seriously considered, and that is the obstruction of the highways by snow and ice and the necessity of protecting the vehi-

cles passing over them from the dangers that recur with each storm. Roads may be reasonably passable in towns and cities, but in the country continuous freezing and thawing and ice and snow impels making provision to insure the safety of men and equipment.

This protection is not impracticable, and it must be provided. The more traffic over a highway the less will these obstructions impede travel, and with any considerable number of machines there will be a much greater degree of safety than if the ways were infrequently traversed. This statement is based on the supposition that only the main highways between commercial centres will be used, and that there will be no service to points not reached by these roads.

Relief of Terminal Congestion.

The congestion at the railroad and shipping terminals in the large seaboard cities has increased very greatly since the beginning of winter and many cars have been diverted to the haulage of fuel and food. Statement is made that the lack of coal at seaports has prevented steamers departing for Europe, there being upwards of 100 in New York alone, and loading in many instances has ceased and the freight has accumulated until every pier and freight house has been filled. Not only this, thousands of tons of commodities of all kinds have been piled outdoors, because of the necessity of discharging the cargoes of cars.

This plan, first proposed in December, 1917, MOTOR TRUCK, has been submitted to and approved by a large number of transportation authorities because of its simplicity, practicality and adaptability to every community or sectional need.

Warehousing has been given little attention by business men. They have been accustomed to leaving consignments in cars and freight stations until they were ready to receive them, paying the demurrage willingly because they escaped the charges for handling and storage until they were ready to receive the goods. Whatever the reason for this delay and retardation, awaiting convenience, lack of transports,

capital, storage facilities or any other cause, the result has been the same, and while the responsibility of any individual, group or class cannot be stated, the accumulation has been extremely large. Added to the volume of freightage that might be moved is, in the main shipping ports, the very large part that is intended for shipment abroad.

To obtain national relief from transportation congestion industrial and commercial bodies must cooperate, and municipal, state and congressional legislation enacted wherever this is desirable to afford fullest use of power vehicle equipment.

Now it is evident that the congestion with reference to any one community is largely a matter that must be dealt with by the commercial and industrial interests. One of the principal causes of the condition is that it was not regarded seriously by individuals, companies or concerns, each executive being more or less indifferent from the fact that he regarded his own methods or policies as being above criticism and at least justified by circumstances.

Radical Change Is Imperative.

Shortage of labor may be an argument, but what was necessary was an entire change of methods of business operating. This means so far as highway transportation is concerned. Instead of tolerating conditions that are known to be wasteful of time and labor, and extremely expensive because of the congestion in freight houses and piers and the heavy highway traffic in business sections, a radical change could be made that would be vastly economical of every element of cost.

No one questions the value of machinery as compared with manual labor, nor of the efficiency of system and organization, but strangely business men with few exceptions will willingly accept what they know will be practically beneficial because of aversion to follow what apparently is regarded as criticism of their judgment. By this is meant that they seemingly prefer to endure conditions or losses rather than admit the wisdom of others.

There are numerous possibilities of relief. Some of these cannot be well applied to all businesses, but they are applicable in many instances. To illustrate: Haulage can be done continuously, so far as the use of the highways is concerned, and by using vehicles with two or even three crews at least twice or even three times the work can be accomplished without increasing equipment. With constant operation

street congestion could be materially lessened, so that faster time could be made; there would be corresponding reduction of delays at loading and unloading platforms; much more work could be done in a given period with the same number of men and vehicles if there were no retardation.

Without exception the streets of business sections of cities that are filled with traffic between 7 a. m. and 6 p. m. are deserted during the remaining hours of the day. There is no good reason why, during the war, the highways should not be utilized as nearly constantly as is possible. That haulage may be done at night the freight houses and piers must be open 24 hours of the day, and business men must make provision for receiving and shipping freight during the hours that their stores or warehouses are now closed. This also applies to deliveries to customers wherever practicable.

Economies of Night Haulage.

Haulage has always been done during day light for the same reason that the greater part of all work is done, but with abundant artificial lighting, unless for the conservation of fuel, it may be carried on as satisfactorily at night as by day. Deliveries from stores and shops to customers can only be made between 7 or 8 o'clock in the morning and 9 or 10 o'clock at the latest in the evening, but this is not the character of distribution that will influence existing freight congestion.

Raw or partly finished materials, fuel, food in bulk shipments, machinery, etc., must be received and distributed from the terminals to the factories, shops and warehouses, and the completed products and repurchased goods and commodities must be in turn delivered to the shipping terminals and to stores, the latter for local distribution. Building and construction material cannot always be handled advantageously because of the usual lack of light and the uncertain conditions for unloading. Ordinarily loading and street travel are not retarded materially as compared with work by daylight.

Congestion can be relieved by finding warehouses



Five-Ton Truck with Stake Platform Body, One of a Fleet of 70 Operated by Stedman Bent, Philadelphia, Pa., for Long Distance Haulage Within a Radius of 350 Miles.

or places of storage, as near as possible to the terminals and stations for freight that cannot be delivered immediately, and by utilizing power vehicle equipment constantly if necessary. There is no probability that there will be receipts of fuel that cannot be taken care of for a long period of time. Merchandise of any kind that may be damaged by exposure to the weather, unless low temperature will cause loss, can be protected in sheds, tents or covered with tarpaulins or whatever will shed water, provided that it is elevated above the ground.

No one doubts that reduction of congestion is a work that will tax the best minds that can be induced to undertake directing and supervising it. That this may be successful in all localities there ought to be agreement by business men to cooperate by following the instructions of the executive in charge of the work, and whenever there is demand to place their haulage equipment at the disposal of the director. This does not mean use of their vehicles without compensation, for in any event handling must be paid for.

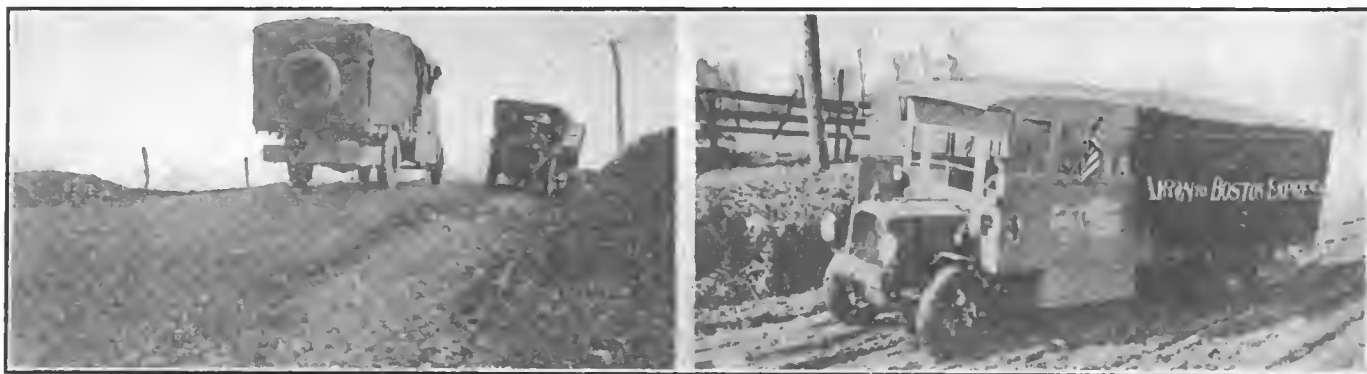
Business Men Must Help Themselves.

Assuming an instance: A concern operating a few

could be handled advantageously, and when this condition has been reached to have the business concerns not only agree to operate so that there shall be no recurrence of congestion, but unite and cooperate whenever necessary to similarly reduce the volume of incoming freight.

Change of Shipping Policies Needed.

The outgoing freight must be handled by the railroads and water lines, but that this shall be done effectively the shippers must completely change the average policy of shipping. Whenever a load can be delivered at a terminal it should be made up and sent from the shop, factory or warehouse, as much prior to the time of departure, instead of as near the time of leaving, as is possible. Were the deliveries made both day and night, without reference to train or vessel departures, there would be little need for waits, such as are now experienced at the piers and terminals of the principal seaports and commercial centres. If the business men operated their vehicles wisely they would have each one that hauled a load to a terminal load and haul another load from the terminal to any destination that might be required. If their own serv-



One of the Fleet of Five Trucks Operated by the Goodyear Tire and Rubber Co., Between Boston and Akron, O., Equipped with Sleeping Quarters for the Crew, Which Makes No Stops Between Terminals—The Illustrations Show the Difference in the Highways Enroute.

trucks has a considerable volume of freight at a terminal that has not been moved. If these trucks are worked 20 or 24 hours of the day for a short period the consignments may be placed in storage at practically no additional cost. In the event that other trucks are hired to supplement the fleet usually operated these will be paid for at prevailing prices for the work, but when the company is called upon to supply trucks to facilitate the haulage of others it will be similarly paid for the use of its machines.

Those who make haulage contract will pay no more if the work is done within a short time than if it were extended over a considerable period. The only requirement would be payment for the work whenever completed, and a transaction of this kind would not be a hardship upon any business man. If financial conditions, such as finding capital to release consignments, necessitate, there would seemingly be means of satisfactorily adjusting these. The main purpose ought to be to clear the freight houses and terminals to a point where the ingoing and outgoing shipments

ice was such that a return load could not be carried they undoubtedly could arrange to haul loads for others. With continuous operation—which is practical with animals with changes of teams—there would be a reduction of day traffic of at least 25 per cent. and as the work could be greatly expedited the economy of time and labor and probably of equipment, would be considerable.

What Highway Haulage Will Do.

One will understand that the principal purpose of business men who will honestly cooperate to improve conditions is to reduce local congestion, and then, to insure against recurrence, to make all shipments within practical radius by highway vehicle. There are many reasons why they should all unite in any endeavor that will bring about relief. Some of these are:

First, release of railroad cars and trackage for operating to destinations that cannot be served by highway vehicles.

Second, obviating the accumulation of what is

classified as local freight, both incoming and outgoing, at the terminals.

Third, insuring against loss of time of men and vehicles waiting at terminals to load and unload.

Fourth, the saving of four handlings, unloading at the terminals, loading the cars or vessels, unloading the cars or vessels and loading at the destination.

Fifth, the saving of time in transit, very frequently days, even for comparatively short distances.

Sixth, making deliveries to customers without delays.

Seventh, receiving deliveries from producers when wanted.

Eighth, developing service that can be absolutely controlled by local business men.

Ninth, insuring adequate service that will be later on competitive with and be absolutely independent of railroads and water transportation companies.

These are real factors that ought to appeal to business men. Every one is a substantial reason that is well founded and which cannot be met by the common carriers as they are now operated. There is seemingly no ground to believe that there will ever be such changes in railroad and water line operating methods that can meet the service that can be afforded by highway vehicles.

Today thousands of tons of commodities are sent by express because of the hopeless uncertainty of freight transportation. Higher express charges are willingly paid to insure transit between points within reasonable limitations of time. The cost is greater, but the need is more important than cost. The ex-

press companies have earned very large dividends because the railroads have not been able to transport freights and make delivery within specified time. So great has been the volume of express shipments that some of the companies have placed embargoes on many classifications of goods, and in some instances have refused to accept all business.

Business men, both commercial and industrial operators, have been seriously affected by this extreme condition, and because of the severity of the winter and the exceptionally pressing demands for fuel and food, many have met with losses of considerable proportions. And there is more than two months of winter yet to come and every prospect of even greater congestion. No one attempts to forecast what the condition will be with the coming of spring, but men of good judgment believe that unless an immediate attempt is made to establish and coordinate highway transportation the business and commercial interests of the nation be enormously retarded.



Tractor Equipped with a Semi-Trailer Having Capacity of 10 Tons, the Body Being Especially Adapted for the Haulage of Bulky Material—A Very Practical Type for Overland Transportation.

MOTOR TRUCK'S HAULAGE PLAN

MOTOR TRUCK has for years maintained that it is the authority of highway haulage for America. For years it has dealt with this subject in every phase and from every angle. Transportation by all road vehicles has been carefully studied with the view of suggesting practical economies obtainable through system, organization and the use of the best of equipment and facilities.

When the needs of the nation became acute the utilization of system and organization and power vehicles, which had been consistently urged to obtain saving of time and labor and cost for the individual or concern, were equally applicable to the country as a whole. The practicality of the project, which appeared to be sufficient in scope to meet the transpor-

tation crisis of a nation of 110,000,000, depended largely upon a head or executive.

This has been met by the foresight of the Council of National Defense, which has created a Highways Transport Committee, and while the initial purpose of this body was to devise means of reducing railroad and shipping terminal congestion, there is apparently no limitation to its scope that would prevent it advising and supervising the highway haulage activities of all commercial and industrial bodies, which are comprehended by the plan proposed by Motor Truck.

Advantages of the Plan.

First of all, were the Highways Transport Committee to assume the jurisdiction proposed, the plan would have the approval and sanction of the govern-

ment. This approval is especially desirable, for it would justify any request that the committee would direct to chambers of commerce, boards of trade, business men's associations or similar organizations.

Second, if the committee were to present the plan, or any adaptation of it that were deemed advisable to make, to these bodies, it would receive consideration, and without question it would be followed so far as it could be practically applied to any community or section.

Third, the information collated for the advice of other bodies or for the committee would be complete and sufficient, and it could be disseminated in such form as would appear to be advisable.

Fourth, the committee, which would be coordinated with other governmental organizations, would have available whatever information was desired to best direct the activities of the different bodies cooperating, and it could bring about uniformity of operations that would not otherwise be practically possible.

Fifth, the committee could obtain vehicles for any

ies within the operating radius, specifying the tonnage shipped in either direction between what may be designated as a "zone centre" and other points.

That taking the main highways between the zone centres as the channels for traffic and with the average tonnage as a basis, haulage contractors, truck owners, truck dealers, garage owners and others engaged in road transportation be offered or guaranteed a definite volume of freight, daily, weekly or monthly, the rates to be based on operating and fixed costs of operation plus a reasonable profit.

That in the event of no available service an operating company or companies be formed, to be operated cooperatively, adequate for whatever tonnage may be offered, the stockholders to make the profit on their own freightage.

That the tonnage be so divided that the trucks shall have loads practically all of the mileage driven, outgoing and incoming.

That collection and delivery be made with small vehicles and large units—not less than five-ton machines—make direct trips between terminals, no deliveries of less than load freights to be made, and such deliveries only when a charge is paid for haulage beyond the terminals.

That collections and deliveries at intermediate points between terminals be made with trailers, extra trailers being used wherever exchanges of loaded or unloaded units can be made.

That wherever practical garage buildings be used for terminals, and that so far as possible the same terminal be used if there is more than one operating company.

That in large communities sub-stations be located for receiving freight, from which collections can be made and delivered at the terminals.

That where contracts for collecting and delivering can be made with operating companies or individuals a complete service for small packages be afforded.

That where such contracts cannot be made collection and delivery service be afforded by the use of small and fast power vehicles.

That freight be classified to be collected, transported and delivered; collected and transported and called for by the consignee upon notification; transported and delivered, and transported, collection and delivery being optional with the shipper, the charges for this being based upon the service.

That each commercial organization establish an information bureau which will supply to all inquirers during business hours information relative to available service, this including name of operating company to any specified point, the rates charged, the character of service and the time of leaving and



An Equipment Especially Suited for the Haulage of Packages Between Collection and Distributing Stations and Terminals Obviating Handling Either Loading or Unloading.

section that was in need of them with the least delay and without disrupting service elsewhere or materially retarding transactions of the power vehicle trade.

Presented in briefest form the plan comprehends the following:

Salient Features of the Plan.

All chambers of commerce, boards of trade, business men's associations, etc., to make surveys of the industrial and commercial enterprises of the communities in which they are located to learn the freight and express tonnage received from and shipped to points within a radius of 100 miles.

That this information be classified so that the aggregate receipts and shipments to each point be determined.

That the tonnage that can be practically handled by highway vehicle to and from each point be learned.

That these business interests agree to make all shipments to these points by vehicles operated by responsible agents, so far as is possible.

That each body communicate with all similar bod-

arrival, and any other necessary fact.

That service information be published and given whatever dissemination may be desirable or necessary.

That companies operate in either direction between any two commercial centres wherever practicable to insure return loads for all vehicles.

That tonnage be guaranteed to operating companies for as long periods as is reasonable to insure to those engaging in haulage sufficient business to justify them making investment and establishing service.

That power vehicles engaged in haulage be worked as continuously as is possible to minimize investment, and to utilize the smallest number of machines that will afford adequate service.

That deliveries be made at night as well as by day when this is practical.

Plan Elastic Enough for Any Need.

This plan is so elastic that it can be adapted to the transportation needs of any community, no matter how large or how small. It does not propose what is impracticable. It proposes the coordination and co-operation of all business interests to establish service that is imperatively necessary and which will be self-sustaining and reasonably remunerative. It does not comprehend the formation of operating companies and the development of business through solicitation, nor competition that will be destructive. It suggests how sufficient tonnage can be obtained to justify operations that will be adequate for immediate needs, and the organization of service with the least expenditure.

In this respect it has numerous advantages when contrasted with ordinary business development. But the country is at war, the necessity is extreme, and operations must be begun as quickly as is possible.

No claim is made that the plan as presented cannot be perfected. But it is intensely practical, is extremely simple, is so elastic that it can be adapted wherever congestion exists to meet any condition, and it suggests means of obtaining information that is vitally necessary before operations can be begun. The plan proposes how business organizations can stimulate the essential activities preliminary to beginning operations, and quick action can result and systematic

relief can be realized in a comparatively short time. With the fundamentals practically outlined the details for operating can be quickly developed.

It Affords Basis for Action.

With the plan as a basis, modified or amplified according to the judgment of those who shall be directly concerned in the operation of highway haulage operations, a very considerable part of local traffic can be diverted from transportation lines and cars, trackage and vessels, and terminals and piers so much relieved that freights can be transported far more expeditiously than now.

No matter how rapidly action may be taken more or less time must elapse before highway haulage can become general, and there is little reason to expect, with every stimulating factor exerted to the utmost, that there will be highway haulage service operating sufficient to afford appreciable relief before spring.

The country has already experienced the effect of the drastic fuel conservation measures of the government, and the loss of practically two weeks (11 full



Demountable Bodies Can Be Quickly Exchanged at Terminals and the Idle Time of the Chassis Practically Obliterated and Marked Economy Obtained.

working days) by all industries and commercial interests operating east of the Mississippi river, means an enormous retardation unless the order of the fuel administrator is greatly modified.

There is abundant reason for the immediate adoption of a plan to operate highway haulage. The nation understands that this is the only prospect for relief, and it is prepared to support whatever action may be taken.

What is wanted is quick action to approve a plan and hasten the inauguration of service, for upon transportation depends the prosecution of the war.

The Business Aspects of the Plan

THE plan proposed by MOTOR TRUCK, for the relief of existing transportation lines by establishing and operating highway haulage service within practical zones, commends itself to business men gen-

erally, but there are those who will question the possibility of a sufficient number of operators engaging in this work to materially reduce the volume of freight now classified by railroads as "short hauls."

Logically any haulage contractor operating with power trucks can turn to this work and service can be inaugurated in very brief time—perhaps a few hours—but organization of companies, obtaining facilities and securing equipment cannot be so quickly accomplished.

Unquestionably, after a survey by a chamber of commerce has established the tonnage received from and shipped to points within a specified operating zone, and whatever can be practically hauled by road vehicle has been classified and averaged for each of the highways on which power trucks or trailers can be operated, the information can be submitted to established contractors, together with assurance, which can best be in agreement form, of a definite volume of tonnage each day or week or month, to be hauled between the zone centre and the different points within the zone to be reached by a proposed service.

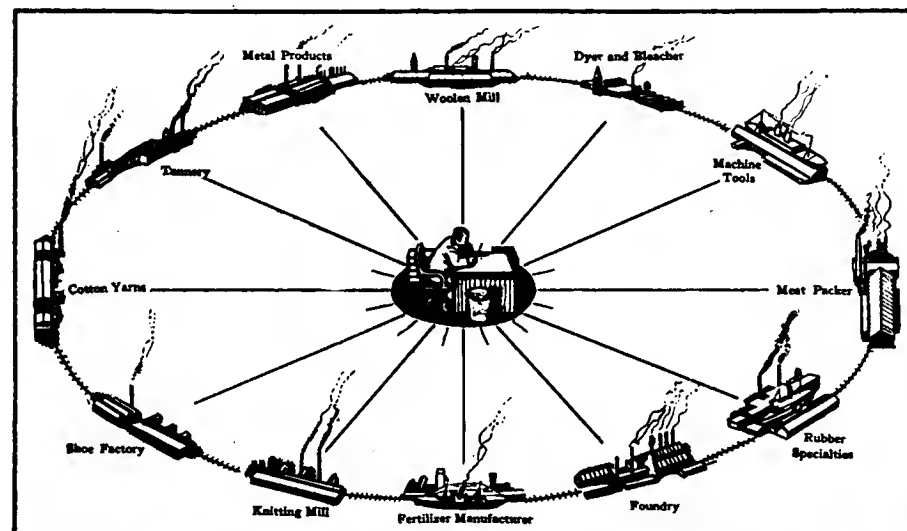
There will be three factors that will interest those who are or might engage in this haulage service. The

First of all haulage by vehicle is intended to expedite transportation, making delivery of shipments the same day they are dispatched, and insuring business men against the delays now experienced with all other means of transportation. The service may be regarded as paralleling the special delivery of the postal department, both for letters and parcel post. There is no doubt that highway haulage cannot be operated for freight rates, perhaps not for express rates, but it is worth all it costs to business men. By this is meant that highway haulage as proposed is not primarily to compete with railroads, water lines and express companies for the purpose of reducing existing rates, but to insure delivery so that business men can fill orders quickly and meet the requirements of their customers. Were time not the principal factor there would be no reason to consider any addition to the services now available.

Tonnage Guarantee to Contractors.

The crux of the proposition so far as the investment of capital in facilities and equipment is concerned is the period that the service shall be guaranteed to the contractors by the shippers. No man would consider investing in trucks for work that would continue but a short period, nor would he feel justified in establishing service for an indeterminate time unless paid very high rates. This phase of the proposal is worthy of careful examination.

The railroads will not operate for rates less than are now paid while under government control. There is every reason to believe that, with the demands of labor to be met, freight and passenger rates



The Traffic Bureau of a Chamber of Commerce Can Be Constantly in Touch with All Locality Industries and Simplify Their Highway Transportation, Insuring Against Duplication of Service and Expediting Shipments and Deliveries.

one is the volume of freight that is to be handled, and operating should be so planned that full loads can be carried for practically all mileage driven. The second is the rates that shall be paid. The third is the period of time that the service shall continue.

Operators Must Make a Profit.

Obviously, to meet emergency, and move a very large tonnage, vehicles might be obtained by payment of charges somewhat exceeding normal prices. This would be a temporary work that would justify such advance. But where a tonnage is to be hauled, an average volume provided for, and the contractor is to be guaranteed a minimum, there must be definite agreement. This may take the form of a guarantee to the contractor of a minimum tonnage for a considerable length of time, for rates that will cover all operating expenses and afford a satisfactory profit. Railroad freight or express rates are by no means the measure by which the prices for the service should be established.

will be considerably increased. There is now pending the application of many, if not all, of the railroads for increases of tariffs. The railroads after the war must expend large sums for rehabilitation, which can only be obtained through increased earnings. This means, if it means anything at all, higher rates for all service. This will necessarily increase the prices for express handling. Viewed from any aspect there is no reason to believe that the present rates will obtain. Analysis of every factor seemingly proves that transportation will cost more for a considerable period of time—probably is.

The railroads cannot handle the freightage offered. There is no prospect for improvement. The highways are open to all traffic. They are not controlled by corporations and they cannot be monopolized. The owner of the single truck has the same rights as the owner of hundreds. The rates for highway haulage service should be based on the cost of operating and a fair profit. There is no reason to base them on wa-

tered stocks or issues of bonds. The operating companies, numbered by hundreds, perhaps thousands, will not be affected by stock manipulations, and, as a matter of fact, they may be owned and controlled by those whom they serve. Not only this, there is no reason why they should not engage in other work aside from the service proposed. By this is meant that a company hauling freight to specific destinations within a given zone could logically operate trucks serving building and construction contractors, coal dealers, mills, shops, factories, warehousing concerns, and, in fact, all doing business that requires what is normally done with highway vehicles.

Many Equipped to Engage in Work.

The men who can first engage in contract haulage as comprehended by the plan are those now affording locality service. They are equipped to undertake a part of it, working nights if they would meet all demands, at least until they can procure additional vehicles. Truck dealers, especially those who have service stations, can undertake regular service, because they can practically utilize machines as advantageously as others, and they can carry on such work without disrupting their sales organizations or materially changing their operating policies. Not only this, nothing would more efficiently demonstrate the value of power vehicles. There is no reason why, if a truck dealer or distributor can sell machines to business men because of their economic value, he cannot at least operate them as profitably as can his customers. Possibly lack of capital may be a deterrent, yet there is apparently no ground for apprehension that this would be a serious obstacle if the proposition were fairly presented to business men to operate on a cooperative basis, sharing the profits made from the freight they supply.

But the day of uncertainty, so far as the practicality or economy of the power truck is concerned, has passed, and the known limitations of horse equipment, the increased operating and maintenance expense, and the almost unlimited possibilities of power truck transportation, mean that there is little need of missionary and educational work. What is really necessary in truck salesmanship is to so adapt their uses to business requirements that their known economies will be realized to the greatest possible degree.

Operators Have Assured Business.

Considering the financial returns from highway haulage operations so far as contract work is concerned, there is no doubt that they can be made profitable with system, organization and good accounting. These are elements that are recognized as necessary in any other business, and there is no good reason why they should not be equally necessary in operations where time and labor cost and mechanical maintenance and efficiency are so imperative.

One may maintain that profits from highway haulage operations are doubtful. This is true of every business engaged in. The value of the proposed plan is that if followed out the haulage contractor has a

definite volume of tonnage assured to him and the rates suggested are what will afford a satisfactory profit for the work. Thus he has a certain work and to handle this sufficient vehicle equipment must be obtained. He can, however, take all work that he can do, for there are no limitations. He can expand his operations as orders justify.

As to the soundness of investment in vehicle equipment. A very large number of companies that are now operating general contract haulage services in different sections of the country are preparing to engage in systematic scheduled transportation between commercial centres without assurance of freight or the cooperation of business men, other than those with whom contracts have been made or are pending,

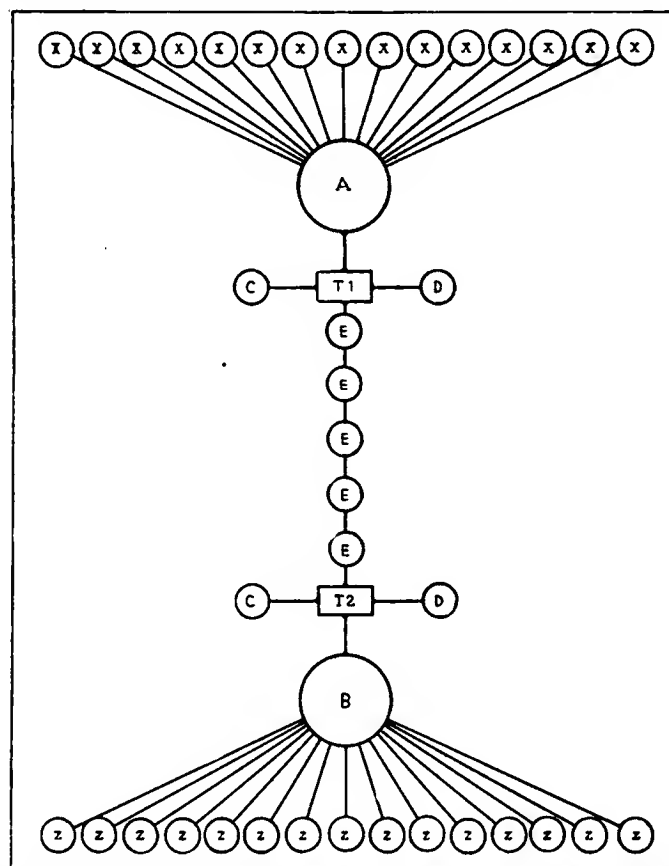


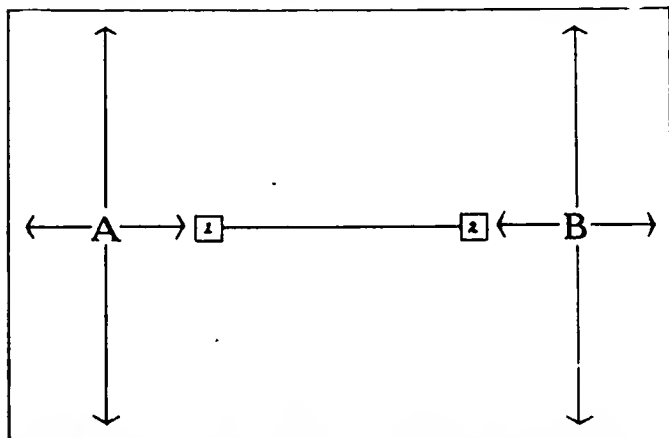
Chart Showing the Operation of the Commercial Body Control: A and B, Zone Centre Chambers of Commerce; x and z, Business and Industrial Enterprises; T1 and T2, Terminals of Operating Companies; C, Collecting Service; D, Delivery Service; E, Intermediate Points Between Terminals Afforded Full Shipping Facilities.

and there is no doubt in the minds of those who have promoted these companies or are interested in them of entirely satisfactory returns.

These operating companies have been organized to afford individuals and concerns service they cannot now obtain. They must compete with all other means of transportation, establish rates that will attract business, and through practical economies and efficiency make sufficient profits to justify continuance. The concerns that have operating experience will have better business results than will those that will engage in haulage without service knowledge, which is logical to expect. The concerns that will make money rapidly will be those that have sufficient equipment to un-

Operators Making Long Hauls

HAULAGE operators or others who may be offered tonnage to be freighted long distances—that is, long distances when compared with ordinary vehicle hauls, may be inclined to question the possibil-



Operation May Be Between Two Terminals Only, Represented by Figures 1 and 2 in Two Cities, Indicated by A and B, or Between These Centres and as Many Others as Needs Justify. The Arrows Point Out the Simplest Form of the Plan in Diagram.

ity of making money, assuming the rates that can be obtained will be comparatively small, and they will undoubtedly ask if companies are now operating and if they are earning satisfactory profit.

The Boston-Akron service of the Goodyear Tire & Rubber Co., inaugurated last April, which makes a round trip of 1560 miles in from six to nine days, covers the greatest mileage of any operated in the United States, and possibly in the world. This now has five machines on the road, one of which, a Mack 7000-pound truck, was delivered just before the close of the year and is making its initial trip this month. The company now has one 3000-pound, two 7000-pound and two 10,000-pound trucks in this work.

The service was inaugurated because of an emergency demand. Deliveries of tires could be made at the Boston branch and fabric brought from the company's mill at Killingly, Conn., with such regularity that it was continued, and it is being increased. Undoubtedly the cost is more than freight, and it is probably greater than express charges, but the trucks can be depended upon and from this aspect alone the expense is justified. No corporation, even of the proportions of the Goodyear company, is needlessly spending money, and without doubt the service is worth the cost of operation, no matter what it may be.

These trucks stop only for replenishing fuel, oil and water and for meals for the crews. Two men man each truck and the machines are equipped so that one may sleep while the other drives, and a regular schedule is adhered to so long as this is physically possi-

ble. The trucks are allowed maximum speeds of 25, 28 and 30 miles an hour, in order of load capacity, and while the average for the fastest trips, not allowing for stops, is slightly less than 12 miles an hour, and about $7\frac{2}{3}$ miles for the slowest trips, the machines will gain practically a day compared with express service and from six to seven days compared with freight service.

Operating its own trucks the company's service has the largest measure of economy. There is no profit paid in addition to operation expense, and as the freights are manufactured products delivered to the branch for distribution and raw material for the use of the tire manufactory, all expense that would ordinarily be necessary for shipments is obviated. The cost to the company is less than were the freights hauled by a contractor, but how much less cannot be clearly estimated. The best evidence of economy, however, is the fact that the company has increased the service, and that it is practical is clearly established by it being operated through the winter.

Boston-Philadelphia Service.

The next longest service is that operated by John F. Letendre, proprietor of the Hamlet Avenue Garage at Woonsocket, R. I., who has contract with mills in Lowell, Lawrence and other cities to haul wool to dye works in Woonsocket and return it to the mills after dyeing. Beginning in the autumn he has sent five-ton trucks to Philadelphia with loads of machinery, which have returned with loads of wool, and one truck made this trip of 632 miles in 92 hours, this including unloading and loading at Philadelphia. Two men manned the truck and no stops were made except for meals, fuel, oil and water, one man sleeping while the other drove.

This service is not to regular schedule, but beginning in March Mr. Letendre purposes to operate trucks regularly between Boston and Philadelphia, which will cover about 340 miles each way, or a total mileage of 670 miles, and the proposed schedule is to be five days for the round trip, this allowing one day for unloading and loading and any mechanical attention that may be necessary. Mr. Letendre states that the schedule as outlined will necessitate from 14 to 15 hours' driving a day, with Bridgeport, Conn., as the specified night stop, and that 30 hours' ought to be an

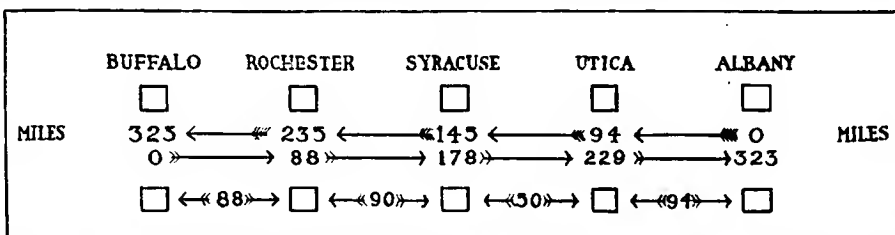


Diagram Indicating Possibilities of Plan Applied to Haulage Across New York State from Albany to Buffalo in Either Direction, Showing That One or Four Companies Could Operate Between the Principal Cities, the Total and Divisional Mileage in Both Directions Shown by Arrows.

approximate driving time in good weather.

Shortest Route to Be Followed.

The trips are now made by the "shore road," which is through Providence and Westerly, R. I., and then skirts Long Island Sound to New York and thence across New Jersey on the Lincoln Highway. When the weather becomes warmer and the interior roads are comparatively free from snow and ice the trips will be via Dedham, Walpole and Wrentham, Mass., Woonsocket, R. I., Putnam, Willimantic, Hartford, New Haven and Bridgeport, Conn., this being considerably shorter than by the more southern highway, which now has the advantage of being less obstructed. The service is with five-ton trucks and capacity loads are carried, the shipments being by tons, there seldom being more than three deliveries to a full load.

The matter of rates for this service is extremely important for those who might consider engaging in such service, and Mr. Letendre states that he can "get by" if he is paid express rates for the shipments, but

upon the volume of business. Mr. Letendre is prepared to use as many machines as will be needed to meet the requirements, and obviously delivery in 48 hours will be far better than can be done with the existing railroad conditions. Mr. Letendre's intention is to make the service permanent, and he has had sufficient assurances to justify the investment that must be made by him. This is undoubtedly the longest haul that has been projected. That it is practical and that it will be profitable there is no doubt in the mind of Mr. Letendre, and as quickly as equipment can be obtained it will be inaugurated.

Detroit-Toledo Highway Service.

What has been stated with reference to hauls that are extremely long only the better establishes the practicality of service that will operate within radius of from 50 to 100 miles. A service is about to be established between Detroit and Toledo, O., which will be operated by a company that will engage exclusively in this work. The distance between the cities is approximately 60 miles and the round trip about 120



Chart Indicating Daily Mileage from 50 to 250 with Reference to Productive Work and Operating Cost, Based on 20.5 Cents a Mile and \$5.89 Overhead, but Not Including Men's, Lodging or Sundry Expenses:

- 1—50 Miles, Total Cost \$16.14, Cost a Mile 32.28 Cents.
- 2—100 Miles, Total Cost \$26.39, Cost a Mile 26.39 Cents.
- 3—150 Miles, Total Cost (One Man) \$36.64, Cost a Mile 24.42 Cents; (Two Men) \$42.53, 28.35 Cents.
- 4—200 Miles, Total Cost (Two Men) \$50.39, Cost a Mile 25.19 Cents.
- 5—250 Miles, Total Cost (Two Men) \$60.64, Cost a Mile 24.27 Cents.

as will be noted, but minimum mileage is required and no time is lost in making deliveries. Were packages carried and considerable time necessary for the delivery of these at either end of a trip a charge for this service would be necessary. In this connection attention should be directed to the fact that the cost of delivering a small package might be as much or more than of one weighing several hundred pounds, so that a flat rate could not be profitably applied. Neither can a consistent charge be made—that is, one that will afford a reasonable profit for the work actually involved—until the delivery is made. This is the reason why the Motor Truck plan suggested that so far as possible haulage be made direct between terminals, and that collection and delivery be done either by other concerns now engaged in this work or by another service.

The number of machines that will be operated between Boston and Philadelphia will depend entirely

miles. The equipment will be five-ton trucks, each hauling two five-ton trailers, the load being 15 tons for each train, and with four trains a day 120 tons can be handled. The purpose is to operate the trains at intervals of three hours, beginning at 5 o'clock a. m. at Detroit and 6 a. m. at Toledo, they being scheduled for six-hour runs. The service will be operated between terminals, with collections and deliveries from these by other vehicles, and the rates will, if statement is correct, be somewhat less than prevailing express charges. This service has been projected because of the existing congestion of all other means of transportation, and the business men who have been asked to give tonnage have offered enough to warrant the purchase of the equipment stated.

A daily service is now operated between Springfield, Mass., and New York City with a five-ton truck leaving each terminal in the morning and making the trip one way each day. The distance is approximately

145 miles and this can be covered in about 14 hours. With loading and unloading at either end the day is long for the crews of the machines, and with bad weather the work is hard, but the roads are extremely good and when clear of snow and ice the conditions for operating are unusually good. The intention is to increase the service as the demands justify.

Many Operating 105 Mile Haul.

The Beam-Fletcher Corporation, Philadelphia, operates 32 trucks regularly between Philadelphia and New York City, a distance of 105 miles, the trucks leaving each city early in the evening of each day and meeting midway on the route. The crews change and return whence they started, this plan being believed to be best because the men have good knowledge of their home cities and can economize time loading and delivering, and at the same time there is no added expense for lodgings and meals, which would be necessary were the crews to have three days a week away from home. The men are better satisfied and the work is more satisfactory as a whole. These trucks are loaded with capacity freights. In addition to these machines the company sends trucks long distances, but these trips are intermittent and not regular.

Stedman Bent, who probably operates more

These data of operating cost are for the information of those who purpose to establish regular service between terminals, and cannot be applied to emergency work, when expense is a secondary consideration.

trucks than any other contractor in the United States, whose headquarters are in Philadelphia, undertakes any haulage work within a radius of several hundred miles of Philadelphia, and while he has not operated freight lines regularly out of Philadelphia, he is prepared to make contract for any tonnage, and some of his emergency jobs have been productive of large prices. He very often sends fleets of trucks to New York and sometimes has dispatched them to New England points.

For more than a year a Philadelphia contractor has operated a line of trucks between New York and that city, carrying package freights in either direction, and he has found the earnings sufficient to justify continuance. More than 50 trips are being operated daily between the two cities.

New York-Providence Route.

The Metropolitan Transportation Co., Providence, R. I., has made a number of trips between that city and New York City, hauling capacity loads with five-ton trucks, and will inaugurate a regular service in either direction beginning in March. This company has contract with the Packard Dredging Co. to follow its work in all parts of southern New England, and besides this it does considerable local haulage. When the freight and express congestion became acute sev-

eral trips were made with loads in either direction, and without solicitation a surprisingly large volume of tonnage was offered at prices that insured a very good profit. The demand developed immediately following the first trip was such that the company determined to operate regularly as quickly as equipment and facilities could be provided. The rates are based on the service afforded without reference to the charges for freight or express transportation.

Cleveland-Chicago Route Planned.

A company headed by Albert N. Reis of Toledo, O., formerly a commission merchant, has been proposed and the plans now making are expected to fructify during February, to operate a truck service between Cleveland, O., and Chicago, with an extension from Toledo to Detroit. A corporation with \$1,500,000 capital is now being considered, and an equipment of 100 or more five-ton trucks is suggested to carry freight rather than engage in an express business, which would require terminal facilities and means of collection and distribution.

The plan of operating proposed is to have each truck carry two drivers and to drive the machines in groups of five, each group to have two mechanics. The driving time between Cleveland and Toledo is

The figures in accompanying tabulations are approximations, based on practical work of an extremely successful concern, developed very largely by the efficiency of its system of close cost accounting.

planned as 12 hours, between Toledo and Chicago 24 hours, between Toledo and Detroit five hours, and between Toledo and Cincinnati 18 hours. While freight will be hauled in capacity loads between terminals the operating plan comprehends transportation between all of the municipal cities along the routes. The details of operation have not as yet been given publicity.

One will note that the companies that have been cited have engaged in long distance haulage between terminals in some of the largest commercial centres of the East, the purpose being to carry full loads in either direction. Unless operated with full freights both ways the operating cost would be very largely increased. Without doubt very large tonnage could be obtained for points intermediate between the terminals. Only a very small part of the freight actually carried between the terminals, a trifling fraction of one per cent., has been offered or is assured. Operated as proposed by the Motor Truck plan the fleets that might be utilized would be numbered by hundreds between the largest cities. This applies to railroad and express routes only. In addition to the constant tonnage may be considered the haulage of crops from May until October, for without doubt farmers would be willing to pay for truck transportation, as

this would insure early delivery to markets and would release them for other work that would be more productive.

The operation of trucks over highways having daily mileages of more than 125 means long hours for the crews. If labor can be obtained for this work, that is, if sufficiently attractive wages can be paid to retain men operating the machines, the financial return is practically certain. Where the highways are good a crew can drive a truck 150 miles and load and unload in a day of from 13 to 15 hours. But where greater mileages must be made the trucks and crews must make night stops, which adds to the operating expense. The most economy obtains where the machines can return to the base of operations each night or when the work has been completed. If two meals and lodging for a crew of two men and a garage charge are added to the operating cost of a truck the price for the work must be increased to meet this expense.

Productive and Unproductive Mileage.

Few realize just how operating cost is influenced by mileage, that is, whether or not it is productive. In illustrating this the operating cost of a five-ton truck is assumed to be 20½ cents a mile and the fixed charge

The companies specified as engaged in or about to begin operations are a few of those known through wide publicity. Thousands of concerns are doing haulage that would be given to operators affording regular service.

\$5.89 with a single driver, wage being \$3.50, or wages \$7 with a crew of two drivers. Wages of helpers are not considered. If a man drives alone about 150 miles is as much as he can reasonably do. If there are two drivers the machine can be driven constantly, and 250 miles is about the maximum expectation. These costs do not include meals nor lodgings for the crew when away from home:

Round trip of 50 miles:	Cost
25 miles out and delivery, productive.....	\$11.01
25 miles in, unloaded, unproductive.....	5.13
	<u>\$16.14</u>

Operating cost a mile 32.28 cents.

Round trip of 100 miles:	
50 miles out and delivery, productive.....	\$16.14
50 miles in, unloaded, unproductive.....	10.25
	<u>\$26.39</u>

Operating cost a mile 26.39 cents.

Round trip of 150 miles:	
75 miles out and delivery, productive.....	\$21.26
75 miles in, unloaded, unproductive.....	15.37
	<u>\$36.63</u>

Operating cost a mile 24.42 cents.

Round trip of 200 miles, two drivers:	
100 miles out and delivery, productive.....	\$29.89
100 miles in, unloaded, unproductive.....	20.50
	<u>\$50.39</u>

Operating cost a mile 25.19 cents.

Round trip of 250 miles, two drivers:

125 miles out and delivery, productive.....	\$25.01
125 miles in, unloaded, unproductive.....	25.63
	<u>\$50.64</u>

Operating cost a mile 24.37 cents.

The operating cost is based on the mileage, but the charge for the productive mileage must be sufficient to cover all the mileage and make a satisfactory profit. As the outward cost must include the fixed expense and wages, it is necessarily greater than the inward cost. Were loads carried inward all mileage would be productive, and obviously, better rates could be made were there revenue instead of the expense shown in the above tabulation.

One will note from the figures that there is a very slow decrease of the operating cost a mile as the mileage is increased, but operating expense will quickly run into money with five-ton units, even with the conservative constants. Considering the advanced costs of supplies, 21.5 cents a mile and \$6 a day fixed cost, a total of \$27.50 a hundred miles, is probably a safer basis for estimating operating expense.

Accepting the tabulation as a basis, however, means only the cost of actually operating the truck. The variable costs include fuel, oil, grease, tires, repairs and maintenance and depreciation (if charged),

Almost unlimited service can be developed with the stimulus of organized commercial bodies. The earning power of this work justifies truck dealers, service station and contractors engaging in it permanently.

and the fixed costs include interest on investment, taxes, registration and licenses, insurance, storage and wages. There are other charges incidental to operating that must be apportioned to each unit from which revenue is derived. There must be two or more terminals for handling the freight, whatever equipment is necessary, office furnishings and supplies, light, heat, clerical labor, perhaps a repair shop with tools and spare parts, wheels and the like, all of which require investment, advertising and solicitation, supervision, claims, emergent expenses and numerous other items which must be considered when the entire cost of operation is determined. The aggregate of these items must be added to the truck overhead and the fixed charges, and the total is the basis for such rates as will insure a profit to the operator. Obviously the greater the number of units against which these items must be charged the smaller will be the proportionate part each must earn. The lower the overhead of the business can be kept the better, and necessarily this will be reflected in the rates for the service.

The best illustration of the use of truck operating costs shown by the tabulation is that these state the expense of operating machine equipment instead of animal, but do not have reference to the other costs of carrying on any business.

Plan to Meet New York's Fuel Emergency

EMERGENCY handling of coal in New York City, which is, or was, just as applicable to any other city where freight or traffic congestion exists, was proposed by M. Charles Schweinert, treasurer and manager of A. Schrader's Son, Inc., to Fuel Administrator Garfield and to President Wilson in telegrams to both those officials under date of Jan. 17, the day before the industrial plants of the eastern section of the country were closed for five days.

The proposition was such that seemingly it could be made operative in a very brief time. There is no question that the office of the Fuel Administrator was inundated with appeals for decision and for exemptions, and for that reason action could not be taken on many meritorious proposals. But without doubt the suggestion of Mr. Schweinert is extremely practical, and if joined in generally the fuel that has accumulated on the New Jersey side of the Hudson river could be, in large part at least, removed to New York City and so far as practical, delivered to those in actual need.

The following telegram, which was sent to National Fuel Administrator Garfield and to State Fuel Administrator Albert H. Wiggin, is self-explanatory:

New York, N. Y.
Jan. 17, 1918.

Dr. Harry A. Garfield,
Fuel Administrator,
Washington, D. C.

This is not criticism, but simply a suggestion which I hope may help in the present emergency. Instead of making the workers of the country idle for a certain number of days, would it not be better to mobilize them for emergency work in this crisis. For instance, for every plant which will shut down through the issuing of your order there are a number of men who could do work at moving coal and loading and unloading the freight cars.

By the daily papers we are told that there is a great accumulation of coal at the Jersey shore of New York bay. Why not mobilize all trucks—especially the automobile trucks—in Greater New York and send them to Jersey for some of this coal; thus relieving the coal scarcity in Greater New York? In order to get the trucks across the Hudson river put into service every ferry boat in Greater New York. I believe it is

true that most of the ferry lines do not operate to their full capacity during the greater part of the day. If their boats were operated full time they could move across the river an enormous quantity of coal, thus relieving the coal cars to return to the mines for more coal.

Strong men, accustomed to or fitted for outdoor work, could be put to work at unloading freight, and I am sure that each concern in Greater New York and the rest of the country affected by the shut down would be willing to contribute whatever number of men and trucks that are fit for this work, and pay them their regular wages if, through such an arrangement the operation of their plants would not be interrupted, but would be permitted to run with such a force as is left. I think this plan should recommend itself to you if for no other reason than that it will save the working people the wages which they will lose through the shut down. This would cause unthinkable suffering. Besides this, at this time we should not create idleness, but rather use our labor in such a way as to speed up the prosecution of the war.

We should follow the example of France at the Marne and under an extraordinary condition do something extraordinary. France, by using means unthought of before to move her soldiers, stopped the German advance. We should try in this crisis by unusual and unthought of efforts to relieve matters and not sit down and rest in idleness. Our concern offers four motor trucks, 30 men, two men for engine room work on ferry boats, and I personally am willing to serve in any capacity should you desire my services.

(Signed)

M. CHARLES SCHWEINERT,

Treasurer and Manager A. Schrader's Son, Inc.

The following telegram, to which was attached a copy of the telegram to Fuel Administrator Garfield, was sent to President Wilson:

New York, N. Y.
Jan. 17, 1918.

President Woodrow Wilson,
White House,
Washington, D. C.

Honorable Sir: I have sent the following telegram to Dr. Garfield, Fuel Administrator. If my suggestion meets with your approval, respectfully ask your assistance in having it carried out.

(Signed)

M. CHARLES SCHWEINERT,

Treasurer and Manager A. Schrader's Son, Inc.

The earnestness of Mr. Schweinert was evidenced by his personal appeal, which was not based upon himself benefiting, and seemingly it was a suggestion that was deserving the serious consideration of those who are directing the policies and activities of the nation in the fuel and transportation crises through which it is now passing.

How Hartford Cleared Its Freight Yard

MUNICIPAL initiative has been productive of a considerable reduction of the congestion in the freight yards of the New Haven railroad at Hartford, Conn., where a plan proposed by Mayor Frank A. Hagarty was operated with surprisingly good results considering the very brief time for advising the business men and the people generally of the details and what was necessary for them to do.

When the factories and shops of Hartford were closed by order of Fuel Administrator Garfield to conserve coal and minimize railroad traffic, Mayor Hagarty believed that the thousands of workers temporarily unemployed might be induced by a continuance of their wages to unload the thousands of freight cars that have been accumulating in the railroad yards of the city. The shortage of labor and

indoor employment ordinarily precluded obtaining anything like a sufficient force of men to make appreciable reduction, but the enforced idle days and the offer of good wages promised to interest the workers if the manufacturers and business men could be induced to cooperate.

Accordingly Mayor Hagarty called a meeting of merchants and operators of shops and factories and a plan was determined. This was to utilize power trucks that were with their crews promised by their owners, and to engage all men attracted by varying publicity willing to handle freight. All freight cars were to be unloaded in a specified order and the freights delivered at warehouses, stores, shops, mills and factories. Means of notifying the consignees to be ready to receive the freight were decided. The

railroad company was anxious to cooperate and the local public service company changed the operating plan of several trolley lines that the trucks might not be obstructed in the work.

Despite the short notice 60 trucks and more than 500 men, including 14 city firemen, worked the first day and unloaded and warehoused 5900 tons of freight from 160 cars. The second day nearly 1000 men and more than 100 trucks emptied considerably more than 250 cars, making a total reduction of something more than 400 cars. Some of these were on yard tracks and a considerable number on private sidings. There were some protests from consignees who were using cars for storage, but without exception the objectors yielded when informed that their attitude would be given deserved publicity. When work was begun upward of 800 cars, laden with 30,000 tons of freight, were in the railroad yard.

There was not as spontaneous a response from the workers of the city as might have been expected, for seemingly many preferred to remain idle rather than

perform work that was as patriotic as any they could engage in, although the severity of the weather might have been a deterrent to those regularly employed indoor. There is reason to believe that had the employers been able to make direct appeal to them, point out the great benefit that would obtain, and have definite understanding relative to pay, the men would have been available in much larger numbers. Not only this, had there been more time for organization a considerable larger number of trucks would have been offered.

The practicality of the plan and its possibilities were amply demonstrated, and there is no reason why it could not be adapted in every city on the proclaimed Monday holidays and a very large measure of relief obtained. What was inaugurated by Mayor Hagarty could be at least imitated by commercial bodies. The municipalities would undoubtedly cooperate, and with the publicity that could be afforded by the newspapers a very large reduction of congestion could be obtained in a comparatively short time.

YULE IS FRUEHAUF DISTRIBUTOR.

W. E. Yule, formerly of the Studebaker and Overland companies, has been appointed Michigan distributor for the Fruehauf Trailer Co. of Detroit, manufacturer of Fruehauf trailers. In entering the trailer business, Mr. Yule, who is one of the most successful automobile salesmen in the West, says that his decision to engage in it was influenced by a study of transportation which convinced him that the trailer was quite as essential and was as great a factor as the motor truck in obtaining economy.

"War time transportation problems that have arisen during the past year," says Mr. Yule, "have proven conclusively the value of the trailer. Many concerns that were formerly depending upon motor trucks alone for transportation have found that with the addition of a few inexpensive trailers they have been able to double their delivery capacity without purchasing additional truck equipment."

A. J. PICARD & CO., INC., WHOLESALERS.

A. J. Picard & Co., Inc., one of the largest and oldest automobile accessory jobbing and distributing houses in the country, will discontinue its retail store at 1700 Broadway, New York City, and in future do exclusively a wholesale business at its new building, Broadway and 61st street.

The head of the company, A. J. Picard, has been identified with the motor car industry for 20 years and is the dean of the trade, having been sales representative for Darracq cars, a French make, that was sold in this country for a number of years. His company now covers all the eastern part of the United States and has a sales force of 24 men, handling automobiles, accessories and serving thousands of dealers.

In addition to its general accessory business the company is distributor in the east for Stromberg carburetors, Gabriel snubbers, the Appollo Rubber Co. and is national distributor of Genemotor starting and lighting equipment for Ford cars, manufactured by the General Electric Co.

FULLER & SONS MFG. CO. ENLARGES PLANT.

Fuller & Sons Manufacturing Co., Kalamazoo, Mich., maker of automobile parts, specializing transmissions and clutches, has experienced a steady and healthy growth which has necessitated constant expansion of manufacturing quarters and facilities. With the latest addition to the plant, approximately 100,000 square feet of floor space is available for manufacturing purposes. The new buildings are constructed of reinforced concrete and are a fireproof type. Over 75 per cent. of the sides of the buildings are steel frame and glass construction, affording a maximum amount of daylight and ventilation. The buildings are heated by forced circulation. The machine tool equipment is the best obtainable and is adequate for a very large production.

BOSCH ANNUAL SALES CONFERENCE.

At the annual sales conference of the Bosch Magneto Co., held at the executive offices in New York City, the main office and branch executives spoke very optimistically of the prospect for business, the conditions at the factory, with reference to labor and materials, being especially favorable. F. D. Norman, superintendent, detailed the conditions obtaining at the works.

4000 MILES OF PARCEL POST ROUTES

Postal Department Plans a Service Linking Many Principle Cities East of Mississippi River and on the Pacific Coast by the Use of Motor Trucks.

MOTORIZATION of the equipment conveying parcel post packages in different sections of the country is now the purpose of the United States Postoffice Department,

and the plan generally determined is now being developed as to detail so that, if retardation is not met, within a comparatively short time there will be a very well defined system of transportation entirely independent of railroads and water lines.

Parcel post haulage and delivery is not regulated as are the other postoffice departments. Vehicles are provided by the local postmasters for collection and distribution

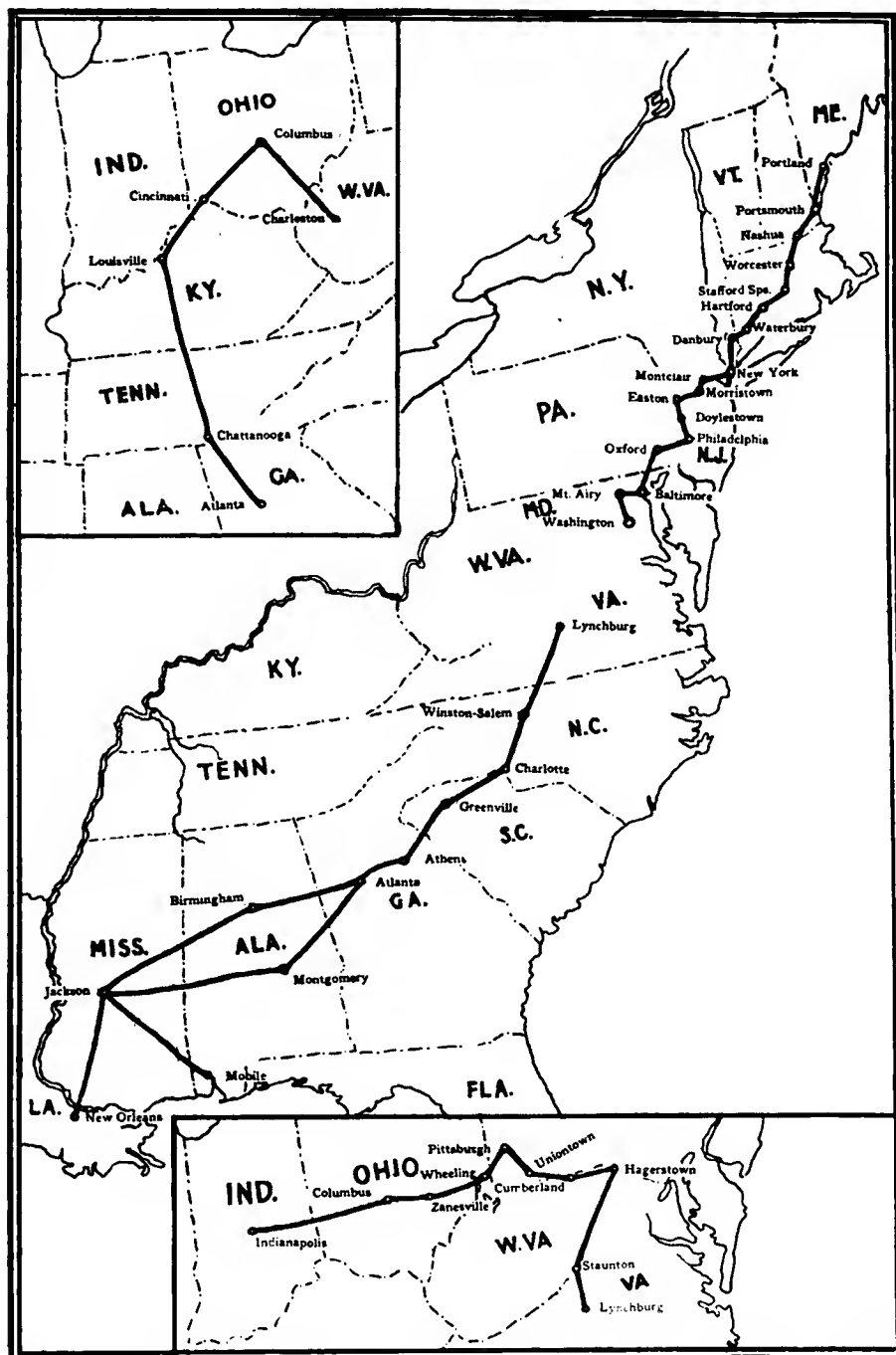
because the bulk is such that it cannot be handled as is other mail. It has been, to the present time, carried by the railroads. Rural delivery carriers are required to use horses or automobiles, and if carriers own machines allowance is made for their use. The government, however, does not require the exclusive use of power vehicles.

Where mail cannot or is not carried by railroads contracts are made with individuals to transport it over what are known as "star routes," which is in a sense a messenger service. Changes in the law relative to those routes specify that the government can require the class of vehicle that shall be used by these contractors, and if the bids for the contracts publicly offered are regarded as excessive the department has authority to purchase and operate power trucks to do this work.

The policy of the Postoffice Department is to not only operate these routes for the transportation of mail, but to handle produce and food of different kinds for delivery by parcel post, so that from one point of view the government will undertake the transportation of food directly from the producer to the consumer. By connecting or linking the star routes the intention is to extend the system so that it will cover a considerable part of the country, and if the results are what is anticipated expansion will be rapid.

The department now has several connected routes, one from Portland, Me., to New Orleans, La., one from Lynchburg, Va., to Indianapolis, Ind., one from Cincinnati, O., to Atlanta, Ga., and others along the Pacific coast. Congress will be asked to enact law that will expedite the expansion of the system. In accordance with the plan as it has been determined, using either routes operated by the government or by contractors, the system includes the following:

New York City to Port Jervis, N. Y., via Belleville, Montclair and Dover, N. J., a distance each way of 86 miles; New



Map Showing the Parcel Post Service Planned with the Use of Motor Trucks by Linking Star Routes to Make Connections Between Principal Cities.

York City to Hamonton, N. J., via Mount Olive, Bordentown, Trenton, Princeton and Ellizabeth, N. J., a distance each way of 114 miles; New York City to Easton, Pa., via Montclair, Morristown and Somerville, N. J., a distance each way of 94 miles; New York City to New Milford, Conn., via Pawling, Yorktown Heights, Briar Cliff and Yonkers, N. Y., a distance each way of 91 miles; New York City to Hartford, Conn., via White Plains, N. Y., Danbury and Waterbury, Conn., a distance each way of 105 miles; New York City to Port Jervis, N. Y., via Goshen and Suffern, N. Y., a distance each way of 84 miles; and from

Philadelphia, Pa., to Easton, Pa., via Hallowell and Doylestown, Pa., a distance each way of 56 miles; Easton to Reading, Pa., via Bethlehem and Allentown, Pa., a distance each way of 51 miles; Pottsville, Pa., to Easton, Pa., via Orwigsburg and Danielsville, Pa.; Harrisburg, Pa., to Reading, Pa., via Lebanon and Robesonia, Pa., a distance each way of 51 miles, and Harrisburg, Pa., to Hagerstown, Md.

Routes extend from Cincinnati to Springfield, O., via Dayton and Miamisburg, a distance each way of 76 miles; Portland, Me., to Nashua, N. H., via Portsmouth and Exeter, N. H., a distance each way of 105 miles; Nashua, N. H., to Hartford, Conn., via Stafford Springs, Conn., and Worcester and East Pepperell, Mass., a distance each way of 127 miles; Hagerstown, Md., to Staunton, Va.; Staunton, Va., to Roanoke, Va.; Winston-Salem to Charlotte, N. C.; Concord to Statesville, N. C.; Charlotte to Camden, N. C.; Camden, N. C., to Columbus, S. C.; Florence to Columbia, S. C., via Darlington and Lydia; Columbia, S. C., to Chapin and Lexington, a distance of 70 miles and return; Charleston, S. C., to Columbia, S. C., via Somerville and Orangeburg, S. C., a distance each way of 126 miles; Orangeburg, S. C., to Augusta, Ga., via Langley and Willis, S. C., a distance each way of 77 miles; Savannah to Statesboro, Va., via Pooler, Bloomingdale, Marlow and Brooklet, a distance each way of 55 miles; Augusta to Macon, Ga.; Macon to Columbus, Ga.; Columbus to Montgomery, Ala.; Greenville, S. C., to Atlanta, Ga.; Atlanta, Ga., to Montgomery, Ala., and Birmingham to Montgomery, Ala., via Verbena and Marbury, Ala., a distance each way of 106 miles.

With the exception of a branch between Washington, D. C., and Richmond, Va., the course of which has not yet been decided on, a chain of routes has been adopted linking Portland, Me., with Nashua, N. H., Nashua with Worcester, Mass.; Worcester with Hartford, Conn.; Hartford with New York City; New York City with Easton, Pa.; Easton with Philadelphia; Philadelphia with Oxford, Pa.; Oxford with Baltimore, Md.; Baltimore with Washington, D. C.; Lynchburg, Va., with Winston-Salem, N. C.; Winston-Salem with Greenville, S. C.; Greenville with Atlanta, Ga.; Atlanta, Ga., with Birmingham or Montgomery, Ala.; Birmingham or Montgomery with Jackson, Miss. Routes will be established Jackson to New Orleans, La., and Jackson to Mobile.

These routes are now surveyed and are being advertised for bids. Where satisfactory bids are not received government owned trucks will be used.

The routes already in operation with government owned trucks are from Washington, D. C., to Leonardstown, Md., a distance each way of 54 miles; from Annapolis, Md., to Solomons, Md., a distance each way of 65 miles; from Washington, D. C., to Baltimore, Md., via Ridgeville; from Baltimore to Philadelphia, Pa., via Belair, Md., Oxford and West Chester, Pa., a distance each way of 110 miles; and from Baltimore to Gettysburg, Pa., via Westminster, a distance each way of 53 miles.

Routes in the middle states will form a chain from Indianapolis, Ind., to Columbus, O.; Columbus to Zanesville, O.; Zanesville to Wheeling, W. Va.; Wheel-

ing to Pittsburgh, Pa.; Pittsburgh to Uniontown, Pa.; Uniontown to Cumberland, Md.; Cumberland to Hagerstown, Md.; Hagerstown to Staunton, Va.; Staunton to Lynchburg, Va.

Further extensions contemplated, but not yet surveyed, are from Charleston, W. Va., to Columbus, O.; Columbus to Cincinnati, O.; Cincinnati, O., to Louisville, Ky.; Louisville to Chattanooga, Tenn., and Chattanooga to Atlanta, Ga.

On the Pacific coast the routes proposed are from Sacramento and San Francisco, Cal., a distance of 125 miles, and between Redlands and Los Angeles, Cal., a distance of 76 miles.

These are the direct routes, but there is expectation that others will be planned and developed so that radiating from the large commercial centres, at least, routes will be available that will leave the rural terminals early in the morning, deliver packages in the cities and return later in the day with freights of packages. Under the present star route contracts "pickups" may be made at all postoffices, or mail may be delivered, but it does not provide for deliveries and collections such as are made by rural mail carriers. The packages carried by parcel post are limited to 50 pounds weight, or which have a combined length and girth not exceeding 84 inches. There is probability that the laws will be amended so that the drivers of these trucks may sell stamps, supplies, deliver registered mail, accept applications for money orders, registered letters, postal insurance, and handle C. O. D. packages, so that the trucks and their drivers will be to all intents and purposes traveling postoffices. The belief of the postal department officials is that the trucks can make trips of from 30 to 40 miles each way a day. In fact there is now awaiting bidders a proposal to operate such a service between Hartford, Conn., and New York City, daily except Sunday, this being a distance of 113 miles, though this mileage may be reduced by a short route that is not covered by railroad transportation.

Proposals are being prepared which will be submitted for bids in different sections of the country, and they are identical with that stated for the Hartford-New York

City route. In some instances a truck will make a trip one way a day and in others at least one full trip. The supposition is that delivery of produce when handled will be made in an average of six hours. The details of each route will depend upon the local conditions, although the same principles will apply.

The use of motor trucks for parcel post service will considerably increase the number that would ordinarily be required for this work, for obviously to obtain the expedition necessary only machines can be used. Not only this, the policy of the government is to handle its own haulage and transfer in each large city, and instead of paying contractors to do this work the intention is to purchase equipment, establish garages and operate the machines according to the methods and system that will be the most economical and efficient. In cities where the government has operated power vehicles for the collection, delivery and transfer of mail, better results have been obtained than where the work has been done by contractors, and the cost has been materially decreased.

Logically there is every reason to found the belief that this policy will obtain and that eventually the entire postal department will be motorized. This means that the truck industry will furnish vehicles to the government. Suggestion is made that following the war the government could very consistently divert the trucks used for military purposes to handling mail, and as the scope of the department is constantly increasing there will be need of large numbers of machines. Whether or not this, if adopted, would be extended to operate the parcel post routes by government owned trucks has not been determined.

A government contract for 1100 class A motor truck bodies, with covers complete, has been awarded to the Hercules Body Co., Evansville, Ind. The bodies are to cost \$203 each.

C. F. KETTERING HEADS S. A. E.

Charles F. Kettering, vice president of the Dayton Engineering Laboratories Co., Dayton, O., was elected president of the Society of Automotive Engineers at the winter meeting of the organization held in New York City during the week of the National Automobile Show. The meeting was very largely attended and from the viewpoint of activities was one of the most interesting ever held in the association.

Mr. Kettering is one of the best known engineers in the industry, having been connected with the makers of Delco products for nine years, and before that in charge of the engineering development of electrical work for the National Cash Register Co. He is a graduate of the Ohio State University.

The other new officers elected are: First vice president, David Beecroft; second vice president, C. C. Hinckley, president and general manager Hinckley Motors Corporation, representing motor car engineers; second vice president, George H. Houston, representing aviation engineering; second vice president,

BECK AND HAWKEYE COMPANIES MERGED.

The Beck Motor Truck Works and the Hawkeye Carriage and Auto Co., Cedar Rapids, Ia., have been consolidated as Beck-Hawkeye Motor Truck Works. The new company has been incorporated with a paid up capital of \$150,000 and will manufacture trucks of one ton, 1½ ton and two-ton capacities. The officers of the company are: President, Martin P. Beck; treasurer, Gothard Schneider; secretary, David Stoflett. The manufacturing schedule for 1918 calls for 1000 trucks. Announcement has been made of the following new agencies for the company's product: Public Motor Co., Chicago, Ill.; Valley Motor Co., Johnstown, Pa.; S. C. Busch, Brooklyn, Ia.; S. L. Weintraub, Sioux City, Ia.; Dell Bros., Mt. Carmel, Ill.; Edw. Miller, Tulsa, Okla.

GOODRICH PROMOTIONS AND CHANGES.

The B. F. Goodrich Rubber Co., Akron, O., has made a number of promotions and changes in its organization to meet exigencies brought on by the war. E. D. Yount has succeeded W. W. Vandever as local manager of the South Bend, Ind., depot. Mr. Vandever has been transferred to the Goodrich sales school. J. W. Moore has been made local manager of the Fort Worth, Tex., depot, and F. S. McNaul has been promoted to local manager of the Hutchinson, Kan., depot. W. J. Balaun has been promoted to the Waco, Tex., depot as manager, and F. T. Reuter becomes local manager of the Oklahoma city depot. W. F. Lees of the San Diego depot has been succeeded by W. F. Burbank, and S. S. Clark has been placed in charge of the depot at Salina, Kan. The Seattle, Wash., branch is being operated by T. B. Graham, who succeeds C. J. Pomeroy, who entered the government service.

FUEL FROM AUSTRALIAN PEAT.

Among the many reports of discoveries of new fuel sources is that of a suitable oil which, it is claimed, can be extracted from the peat fields of New Zealand and Australia. It is stated that from 20 to 30 gallons of fuel can be extracted from each ton of the peat.

P. D. BURRESS APPOINTED INSPECTOR.

P. D. Burrress, formerly with the Maxwell Motor Sales Corporation, has been appointed inspector on government work at the plant of the Nash Motors Co.



Mack Fire Apparatus Attached to the Department of Wallace, Ida., That is Operated with a Snow Plow During the Winter—The Equipment Makes the Machine More Practical During Storms, but Does Not Lessen Utility for Protective Purposes.

Fred Glover, Emerson-Brantingham Co., representing tractor engineering; second vice president, Henry R. Stuphen, vice president Submarine Boat Corporation, representing marine engineering; second vice president, H. R. Brate, representing stationary internal combustion engineering; secretary-general manager, Coker F. Clarkson; treasurer, Charles B. Whittelsey, vice president Hartford Rubber Works.

The councilors for the ensuing year are: B. B. Bachman, engineer Autocar Co., Ardmore, Pa.; H. L. Horning, engineer Waukesha Motor Co., Waukesha, Wis., and chairman Automotive Section of the War Industries Board; C. W. McKinley, chief engineer, Willys-Overland Co., Toledo, O.; George W. Dunham, past president; Russell Huff, past president, Councilors for 1919, Charles S. Crawford, chief engineer Premier Motor Corporation; Charles M. Manly, vice president and chief engineer, Curtiss Aeroplane Co.; J. V. Whitbeck, chief engineer, Chandler Motor Car Co.

GARFORD TRUCK SUPPLANTS TRAMWAY.

When the power plant of the tramway line between the towns of Leonora and Gawlia, Australia, was destroyed by fire, the owners decided not to rebuild as the enterprise had not been profitable. There were quite a number of people, however, who had to make the trip between the two towns daily on business, and one enterprising citizen sensed a profit if he could restore communications on the line with some inexpensive motive power. He secured an old Garford truck, had some railway wheels made for it and a large body. He secured a lease of the tracks and placed "The Tank," as he calls it, in operation. The commuters are thoroughly satisfied with the service and it is showing a profit to its owner.

RUSSIAN AUTOMOBILE ENGINEERING CO.

The Russian Automobile Engineering Co. has been formed to succeed Pluym-Och, Ltd., of Petrograd and New York and will conduct the export business handled by the latter company for the past six years. The company has long time contracts for the exclusive sale in Russia of a number of well known American motor trucks and passenger cars.

The company is distributing agent in Russia for the Federal Motor Truck Co., Hurlburt Motor Truck Co., Hudson Motor Car Co., Hupp Motor Car Co., Pierce-Arrow Motor Car Co., Mitchell Motors Co., Inc., Henderson Motor-cycle Co., and the Domestic Electric Co. Gaston, Williams & Wigmore, Inc., is the financial and forwarding agent of the company, which has offices at 120 Broadway in New York City and in Petrograd at Kazanskaja Ploschad 3.

TO INCREASE EFFICIENCY OF GASOLINE.

The Inter Lube Chemical Co. of Delaware has been formed to take over the old company of that name in Cleveland, O., and has a capital of \$1,000,000. The company will manufacture a compound which is said to increase the efficiency of gasoline 25 per cent. The company is headed by H. J. Mayers of Cleveland, president of the Mutual Motor Stores Co.

WILLIAMS DESIGNER FOR LANG BODY.

L. L. Williams, formerly with the Peerless Motor Car Co., Cleveland, O., has been appointed designer and production manager for the Lang Body Co. of that city. The company will start on an increased production schedule about the first of the year.

JONES MOTOR CAR CO. WILL BUILD TRUCK.

The Jones Motor Car Co., Wichita, Kan., which manufactures Jones passenger cars, has started production of a one-ton truck which will sell for \$1100. This model will be on the market early in February, according to an announcement by President J. J. Jones, who also announces the production of a two-ton model, which will be ready to market about March 1.

The one-ton model is equipped with a model N Continental engine, having four cylinders, with bore of $3\frac{3}{4}$ inches and stroke of five inches. The ignition is high tension and a vertical tube radiator is used with the water circulated by a gear driven centrifugal pump, supplemented by a fan mounted on the engine block.

The front springs are 44 inches long and two inches wide, with nine leaves, and the rear springs are 52 inches long, three inches wide, with 10 leaves. Solid tires are used, 34 by $3\frac{1}{2}$ inch front and 34 by 4 inch rear. The chassis has a wheelbase of 130 inches and



Group of Representatives and Salesmen Attending a Sales Conference of the Sewell Cushion Wheel Co., Recently Held at Detroit, Mich.

weighs 2750 pounds.

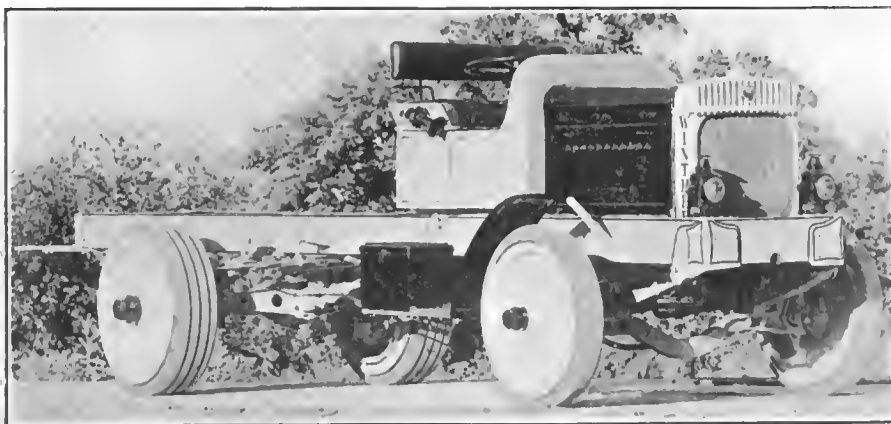
The production schedule for the current year calls for 2000 trucks.

WESTINGHOUSE GENERATORS FOR WAR.

The Westinghouse Electric and Manufacturing Co., Pittsburgh, Pa., is manufacturing electric generators to meet specifications of the government for military trucks, and will supply these generators of the same type for the 1918 output of Locomobile, Pierce-Arrow and Garford trucks.

MEXICO A WONDERFUL TRUCK MARKET.

According to A. H. Beckett of El Paso, Tex., who is now in Detroit, there is a wonderful market for trucks, passenger cars and accessories in the El Paso territory, as well as Mexico. The El Paso territory alone, he says, will require 10,000 trucks and cars next year.



Seven-Ton Winther Chassis Complete, the Last Unit of the Series, Designed to Endure Extremely Hard Service.

Winther Truck Series Complete

Seven Chassis, Sized in Multiples of 2000 lbs., Internal Gear Driven, Now in Production

PRODUCTION of 2000 and 14,000-pound trucks has completed the series of machines to be built by the Winther Motor Truck Co., Winthrop Harbor, Ill., and statement is made that this is the first time in the industry where a concern practically started with every size vehicle that had been planned for. That this is possible is, according to Martin Winther, due to the fact that the fundamental design of all machines is the same, the difference being in size only.

The Winther company began production about a year ago. Mr. Winther, chief engineer and president, was for years experimental engineer of one of the leading truck manufacturing companies. He was commissioned to go to the Mexican border when Gen. Pershing made expedition into that country to study truck design as developed by service requirements, and he became convinced that there were faults and weaknesses, which appeared in aggravated form in Mexico, that has been ascribed to overloading, careless driving, etc.

After eight months' observation and study Mr. Winther returned and the Winther company was formed, first being located at Kenosha and later in a new plant at Winthrop Harbor. Claim is made that with no old policies to protect, with a free hand and ample capital a truck was designed with careful regard for the experience of the Mexican service.

Winther trucks are now built in 2000, 4000, 6000, 8000, 10,000, 12,000 and 14,000-pound load capacities. The dimensions of the construction units are with a view of obtaining exceptional strength and large factors of safety. The frames range from five-inch steel channel for the 2000-pound chassis to nine-inch for the 14,000-pound truck. Standard or long wheel-base lengths are obtainable in all sizes. The engines are four-cylinder, ranging

from $3\frac{1}{2}$ to $5\frac{1}{2}$ inch bore, with six-inch stroke and rated by the S. A. E. formula as 19.60, 35.60, 25.60, 28.90, 36.10, 40.02 and 40.02 horsepower. The engines are suspended on three points and are protected from chassis distortion.

The engine valves are tungsten steel and are very large. The lubrication for all power plants is a positive pressure system with distribution through hollow crankshafts. Mr. Winther maintaining that this has been proven conclusively to be the better where the demands for power are exceptional. The ignition current sources are Elsemann magnetos and the fuel is supplied to Master carburetors through Stewart vacuum system feeds. The gasoline tanks are under the seats. All engines are equipped with Simplex centrifugal type governors. The radiators are copper tube cores and cast cases that are suspended entirely independent of the hoods.

The clutches are a dry plate type, 12-inch plates being used in all chassis. The transmission gearsets are a selective sliding gear construction, those of the three smallest machines having three forward speed ratios and the others four. The gears are large, have wide faces and are of $3\frac{1}{2}$ per cent. nickel steel. The drive is by large tubular shafts to internal gear rear axles, the dead axle units being rectangular drop forged steel sections. The front axles are Timken with Timken bearings.

The springs of all trucks are semi-elliptic, unusually heavy, varying from 46 and 56 inch length on the front and rear of the smallest units to 46 and 56 inch length on the 14,000-pound chassis, the width and number of leaves being dependent on the capacity of the truck. The springs are chrome vanadium steel, every leaf of a uniform quality and claim is made that no Winther truck spring has been broken in service. The steering gear is a worm and nut non-adjustable type. The brakes are external con-

tracting and internal expanding, which are maintained to have the largest braking area, type for type, of any trucks built in America. The four largest trucks are equipped with cast steel wheels, and these will be used instead of wood on the 4000 and 6000-pound machines when required. Careful attention has been applied to construction detail, even to so seemingly a trifling matter as altering the practice in the clearance of spring shackle bolts.

The company claims that Winther trucks are exceptionally high in grade and that the quality of the machines has been recognized—that they are known to the industry and trade as such. The company has established a sales organization that is active the country over and it has representation in all the principal commercial centres.

ABBE IS LITTLE GIANT MANAGER.

Clifford T. Abbe has been appointed district manager of Washington, D. C., branch of the Little Giant Motor Truck Co., which covers the territory comprising the State of Maryland, District of Columbia, Virginia, North and South Carolina, Georgia, Florida and Alabama. Mr. Abbe was formerly connected with the Stoddard Motor Car Co. of Springfield, Mass.

LEHMKUHL JOINS AIR-O-FLEX CO.

Charles D. Lehmkuhl has been elected secretary and a director of the Air-O-Flex Automobile Corporation, succeeding G. L. Nadel, who resigned to devote his entire time to his other interests. Mr. Lehmkuhl is well known in the industry and was credit manager of the E. R. Thomas Detroit Co. for nine years.

M. R. SANBORNE PROMOTED.

Maurice R. Sanborne has been appointed assistant sales manager of the Commonwealth Finance Corporation of 100 Broadway, New York City. He has been connected with the company since Aug. 1, 1917.

COLLIER MOVES TO BELLEVUE, O.

The Collier Motor Truck Co. has moved from Cleveland, O., to Bellevue, in the same state, and R. A. Palmer, formerly of the Pontiac Chassis Co., Pontiac, Mich., has been placed in charge of production.

SHEEHAN RESIGNS FROM GLOBE CO.

Walter F. Sheehan has resigned as general manager of the Globe Motor Truck Co., East St. Louis, Ill. He has made no announcement concerning his future plans.

PEARSON REPRESENTS DENBY.

A. N. Pearson has established headquarters in Boston as the district representative in New England for the Denby Motor Truck Co. of Detroit, Mich.

MOTOR TRUCK MODELS, CAPACITIES AND PRICES

Alphabetical Arrangement of the Manufacturers and Indices of the Pages on Which the Specifications of their Products Can Be Found.

Abbott & Downing Co., Concord, N. H.					Brincoe Motor Corp., Jackson, Mich.					Deahy Motor Truck Co., Detroit, Mich.				
Model	Cap.	Chas. Price	Comp.	Page	Model	Cap.	Chas. Price	Comp.	Page	Model	Cap.	Chas. Price	Comp.	Page
B	2,000	\$1,750	.....	30	Light Del	1,000	\$725	.....	28	12	2,000	\$1,460	.....	30
A	4,000	2,400	.....	35	Brockway Motor Truck Co. of Cortland, Homer, N. Y.					13	4,000	2,025	.....	35
Arcason Motor Truck Co., Detroit, Mich.					Model	Cap.	Chas. Price	Comp.	Page	15	6,000	2,525	.....	40
Model	Cap.	Chas. Price	Comp.	Page	J2	3,000	\$2,450	.....	32	210	10,000	4,900	.....	45
B	3,000	\$2,400	.....	..	K3	4,000	2,850	.....	35	Detroit-Wyandotte M. Co., Wyandotte, Mich.				
H	4,000	2,750	.....	35	R	7,000	3,750	.....	41	Model	Cap.	Chas. Price	Comp.	Page
L	7,000	3,600	.....	41	Buckeye Mfg. Co., Anderson, Ind.					..	3,000	\$2,600	.....	33
M	10,000	4,600	.....	44	Model	Cap.	Chas. Price	Comp.	Page	FG	4,000	2,750	.....	36
Light Trac.	..	2,850	.....	..	V2	2,000	\$1,700	.....	30	..	6,000	3,550	.....	40
Heavy Trac.	..	4,200	.....	..	Balek Motor Co., Flint, Mich.					..	10,000	4,750	.....	45
Aeae Motor Truck Co., Cadillac, Mich.					Model	Cap.	Chas. Price	Comp.	Page	Diamond T Motor Car Co., Chicago, Ill.				
Model	Cap.	Chas. Price	Comp.	Page	E4	500	.....	\$790	28	Model	Cap.	Chas. Price	Comp.	Page
B	2,000	.....	.....	29	Chase Motor Truck Co., Syracuse, N. Y.					J5	2,000	\$2,000	.....	30
A	4,000	.....	.....	35	Model	Cap.	Chas. Price	Comp.	Page	J4	3,000	2,425	.....	32
C	7,000	.....	.....	41	T	1,500	\$1,500	.....	28	J3	4,000	2,775	.....	35
D	8,000	.....	.....	44	A	2,000	1,725	.....	29	LB	7,000	3,950	.....	41
American & British Mfg. Co., Prov., R. I.					C	3,000	2,025	.....	32	R	10,000	4,750	.....	45
Model	Cap.	Chas. Price	Comp.	Page	B	5,000	2,475	.....	38	Dispatch Motor Car Co., Minneapolis, Minn.				
..	6,000	.....	.....	40	X	6,000	2,800	.....	40	Model	Cap.	Chas. Price	Comp.	Page
5J	10,000	.....	.....	44	O	7,000	3,600	.....	41	L	1,500	\$1,100	\$1,250	28
American Motor Truck Co., Detroit, Mich.					Chicago Pneu. Tool Co., Chic. Heights, Ill.					N	1,500	1,100	1,150	..
Model	Cap.	Chas. Price	Comp.	Page	Model	Cap.	Chas. Price	Comp.	Page	Doane Motor T. Co., San Francisco, Cal.				
30	7,000	\$3,450	.....	41	15	2,000	.....	.....	31	Model	Cap.	Chas. Price	Comp.	Page
O. Armleder Co., Cincinnati, O.					16	4,000	.....	.....	36	1918	5,000	.....	\$3,500	38
Model	Cap.	Chas. Price	Comp.	Page	17	7,000	.....	.....	42	1918	12,000	.....	5,300	47
HW	4,000	\$2,750	.....	35	Clyde Cars Co., Clyde, O.					Dorris Motor Car Co., St. Louis, Mo.				
KW	7,000	3,600	.....	41	Model	Cap.	Chas. Price	Comp.	Page	Model	Cap.	Chas. Price	Comp.	Page
Atterbury Motor Car Co., Buffalo, N. Y.					30	2,000	.....	.....	30	K4	4,000	.....	.....	36
Model	Cap.	Chas. Price	Comp.	Page	45	3,000	.....	.....	32	Daplex Truck Co., Lansing, Mich.				
7R	3,000	\$2,475	.....	32	65	4,000	.....	.....	35	Model	Cap.	Chas. Price	Comp.	Page
7C	4,000	2,875	.....	35	90	7,000	.....	.....	41	D	7,000	\$4,00	.....	41
7D	7,000	3,775	.....	41	120	10,000	.....	.....	44	Darnbie Dayton Truck Co., Dayton, O.				
Autocar Co., The, Ardmore, Pa.					The Collier M. Truck Co., Bellevue, O.					Model	Cap.	Chas. Price	Comp.	Page
Model	Cap.	Chas. Price	Comp.	Page	15	1,500	\$835	\$885	28	H	4,000	\$2,650	.....	35
21F	4,000	\$1,815	.....	35	Columbia M. T. & T. Co., Pontiac, Mich.					..	7,000	3,400	.....	41
Available Truck Co., Chicago, Ill.					Model	Cap.	Chas. Price	Comp.	Page	K	7,000	3,400	.....	41
Model	Cap.	Chas. Price	Comp.	Page	E	4,000	\$1,990	\$2,140	35	M	10,000	4,500	.....	44
A1	2,000	\$1,950	.....	29	Commerce Motor Car Co., Detroit, Mich.					E	15,000	4,950	.....	48
B2	4,000	2,650	.....	35	Model	Cap.	Chas. Price	Comp.	Page	Economy Motor Co., The, Lima, O.				
C3	7,000	3,650	.....	41	EA	2,000	\$1,340	\$1,375	30	Model	Cap.	Chas. Price	Comp.	Page
D5	10,000	4,600	.....	44	EH	2,000	1,340	1,450	..	G36	1,500	\$885	.....	28
Barber Motors Corp., Brooklyn, N. Y.					ES	2,000	1,340	1,490	..	Fageol Motors Co., Oakland, Cal.				
Model	Cap.	Chas. Price	Comp.	Page	Consolidated M. Corp., Sebeneetady, N. Y.					Model	Cap.	Chas. Price	Comp.	Page
Tractor 3	12,000	\$2,500	.....	47	Model	Cap.	Chas. Price	Comp.	Page	..	4,000	\$3,000	.....	36
The Barker Factory, Norwalk, Conn.					40	4,000	\$3,000	.....	38	..	7,000	4,000	.....	42
Model	Cap.	Chas. Price	Comp.	Page	70	7,000	2,500	.....	43	..	10,000	5,000	.....	45
U	2,000	\$1,800	.....	29	Continental Motor T. Co., Chicago, Ill.					Fargo Motor Car Co., Chicago, Ill.				
U	3,000	1,700	.....	32	Model	Cap.	Chas. Price	Comp.	Page	Model	Cap.	Chas. Price	Comp.	Page
V	4,000	1,900	.....	..	FL	2,000	\$1,750	.....	30	P	4,000	\$2,200	.....	36
V	5,000	2,000	.....	38	HL	3,000	2,100	.....	32	Federal Motor Truck Co., Detroit, Mich.				
Beck-Hawkeye M. T. Works, C. Rapids, In.					J	4,000	2,300	.....	35	Model	Cap.	Chas. Price	Comp.	Page
Model	Cap.	Chas. Price	Comp.	Page	M	7,000	3,300	.....	41	S	2,000	\$1,900	.....	30
A	2,000	\$1,140	.....	29	Corblitt Motor Truck Co., Henderson, N. C.					T	3,000	2,350	.....	33
B	3,000	1,350	.....	32	Model	Cap.	Chas. Price	Comp.	Page	U	4,000	2,600	.....	36
C	4,000	1,750	.....	35	E	2,000	\$1,800	.....	30	W	7,000	3,350	.....	42
Beech Creek T. & A. Co., Beech Creek, Pa.					D	3,000	2,200	.....	32	X	10,000	4,400	.....	45
Model	Cap.	Chas. Price	Comp.	Page	C	4,000	2,650	.....	35	Ford Motor Co., Detroit, Mich.				
3A	6,000	\$2,850	.....	40	B	5,000	3,000	.....	38	Model	Cap.	Chas. Price	Comp.	Page
Bell Motor Car Co., Inc., York, Pa.					AA	10,000	4,500	.....	44	T	2,000	\$600	.....	30
Model	Cap.	Chas. Price	Comp.	Page	Conple-Gear F. W. Co., G. Rapids, Mich.					Forschler M. T. Mfg. Co., New Orleans, La.				
18	1,200	\$850	\$970-\$995	28	Model	Cap.	Chas. Price	Comp.	Page	Model	Cap.	Chas. Price	Comp.	Page
Bessemer Motor T. Co., Grove City, Pa.					HC	7,000	\$5,600	.....	41	S	1,500	\$1,100	.....	28
Model	Cap.	Chas. Price	Comp.	Page	AC	10,000	6,400	.....	44	A	2,000	1,900	.....	30
G	2,000	.....	.....	29	Croce Automobile Co., Ansbary Park, N. J.					B	4,000	2,500	.....	36
J	4,000	.....	.....	35	Model	Cap.	Chas. Price	Comp.	Page	Four Wheel D. A. Co., Clintonville, Wis.				
K	7,000	.....	.....	41	17	1,000	\$825	.....	28	Model	Cap.	Chas. Price	Comp.	Page
Bethlehem Motors Corp., Allentown, Pa.					Dart Motor Truck Co., Waterloo, Ia.					B	6,000	\$4,600	.....	40
Model	Cap.	Chas. Price	Comp.	Page	Model	Cap.	Chas. Price	Comp.	Page	Enlton M. T. Co., Farmingdale, L. I., N. Y.				
A1	2,500	\$1,245	\$1,305	32	E	2,000	\$1,850	.....	30	Model	Cap.	Chas. Price	Comp.	Page
B1	4,500	1,775	1,845	38	CC4	4,000	2,470	.....	35	FX	3,000	\$1,420	\$1,420	33
Blair Motor Truck, Newark, O.					L	7,000	3,400	.....	41	Gabriel Motor T. Co., The, Cleveland, O.				
Model	Cap.	Chas. Price	Comp.	Page	Dny-Elder Motors Corp., Newark, N. J.					Model	Cap.	Chas. Price	Comp.	Page
C	4,000	\$2,850	.....	35	Model	Cap.	Chas. Price	Comp.	Page	C	2,000	\$1,750	.....	30
D	6,000	3,250	.....	40	J	1,500	\$950	.....	28	E	4,000	2,750	.....	36
F	10,000	4,250	.....	44	B	2,000	1,495	.....	30	F	7,000	3,750	.....	42
Bonne Magnetite Truck Co., Phila., Pa.					C	3,000	1,755	.....	32	Garford Motor Truck Co., Lima, O.				
Model	Cap.	Chas. Price	Comp.	Page	D	4,000	1,835	.....	35	Model	Cap.	Chas. Price	Comp.	Page
VM	4,000	\$3,500	.....	35	C	5,000	2,365	.....	38	75B	2,000	\$2,100	.....	30
XM	7,000	4,200	.....	41	De Kalb Wagon Co., De Kalb, Ill.					66B	3,000	2,500	.....	33
Bowling Green M. C. Co., Bowling Green, O.					Model	Cap.	Chas. Price	Comp.	Page	70B	4,000	3,000	.....	36
Model	Cap.	Chas. Price	Comp.	Page	E	4,000	\$2,100	.....	35	77B	7,000	3,900	.....	42
30	1,500	\$1,800	.....	29	E	5,000	2,450	.....	38	68	10,000	4,700	.....	45
Brinton Motor Truck Co., Phila., Pa.					Detroit-Wyandotte M. Co., Wyandotte, Mich.					69	12,000	4,900	.....	47
Model	Cap.	Chas. Price	Comp.	Page	Model	Cap.	Chas. Price	Comp.	Page	70B	9,000	3,100	.....	47
H	2,000	\$1,250	\$1,400	29	..	3,000	\$2,600	.....	33	77	14,000	4,000	.....	..
F	5,000	2,500	.....	38	..	6,000	3,550	.....	40	68	20,000	4,800	.....	..

Gary Motor Truck Co., The, Gary, Ind.				
Model	Cap.	Chas. Price	Comp.	Page
F	2,000	.....	.....	30
G	3,000	.....	.....	33
H	4,000	.....	.....	36
HU	5,000	.....	.....	38
K	7,000	.....	.....	42

Gem Motor Car Corp., G. Rapids, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
..	1,000	\$675	.....	23

General Motors Truck Co., Pontiac, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
16	1,500	.....	.....	28
21	2,000	.....	.....	30
31	3,000	.....	.....	32
41	4,000	.....	.....	36
71	7,000	.....	.....	42
101	10,000	.....	.....	45

Geneva Wagon Co., Geneva, N. Y.				
Model	Cap.	Chas. Price	Comp.	Page
B	1,500	\$700	\$750	28
C	1,500	700	800	..

Gerlinger Motor Car Co., Portland, Ore.				
Model	Cap.	Chas. Price	Comp.	Page
C	2,500	\$2,500	.....	32

Globe Motor Truck Co., E. St. Louis, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
A1	2,000	\$1,425	.....	30
B	3,000	1,750	.....	33
C	4,000	2,050	.....	..

Gramm-Berustein Motor T. Co., Lima, O.				
Model	Cap.	Chas. Price	Comp.	Page
..	2,000	\$1,900	.....	30
..	3,000	2,300	.....	33
..	4,000	2,600	.....	36
..	5,000	3,150	.....	38
..	7,000	3,800	.....	42
..	10,000	4,700	.....	45

Grant Motor Car Corp., Cleveland, O.				
Model	Cap.	Chas. Price	Comp.	Page
12	1,800	\$960	\$1,020-\$1,065	29
10	3,000	1,490	.....	33
11	3,000	1,585	.....	33
15	4,000	1,790	.....	36
16	4,000	1,885	.....	36
13	6,000	2,462	.....	..
14	6,000	2,325	.....	..

Haba Motor Truck Co., Hamburg, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
..	1,500	\$1,100	.....	29
..	3,000	1,950	.....	33
..	7,000	2,900	.....	42

Hamilton Motors Co., Grand Haven, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
A	2,000	\$895	.....	31
B	3,000	1,095	.....	31

Harrison Co., Robert, S. Boston, Mass.				
Model	Cap.	Chas. Price	Comp.	Page
F	7,000	.....	.....	42
C	7,000	.....	.....	42

Harvey Motor Truck Co., Harvey, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
WFA	5,000	\$2,850	.....	38
WHA	7,000	3,850	.....	42
WKA	10,000	4,600	.....	45
HT	14,000	3,850	.....	47

Hawkeye Truck Co., Sioux City, Ia.				
Model	Cap.	Chas. Price	Comp.	Page
J	3,000	\$1,750	.....	33

Hendrickson Motor T. Co., Chicago, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
G	4,000	.....	.....	36
H	7,000	3,000	.....	42

Hercules Motor T. Co., Milwaukee, Wis.				
Model	Cap.	Chas. Price	Comp.	Page
..	4,000	\$2,800	.....	36
Highw'y S.	7,000	3,750	.....	42
..	7,000	.....	.....	..
..	10,000	4,750	.....	45

Higrade Motors Co., Harbor Springs, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
A18	2,000	\$1,800	.....	30

Highway Tractor Co., Indianapolis, Ind.				
Model	Cap.	Chas. Price	Comp.	Page
A	10,000	\$1,750	\$1,750	46

Hoover Wagon Co., York, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
15B	1,500	\$1,375	.....	29

Hurlburt Motor T. Co., New York City.				
Model	Cap.	Chas. Price	Comp.	Page
1	3,000	\$2,600	.....	33

Independent Motor Corp., P. Haddon, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
F	2,000	\$1,385	.....	30
G	4,000	1,850	.....	36

Indiana Truck Corp., Marion, Ind.				
Model	Cap.	Chas. Price	Comp.	Page
T	2,000	\$1,800	.....	30
D	4,000	2,500	.....	36
R	7,000	3,200	.....	42
L	10,000	4,200	.....	45

International H. Co. of A., Chicago, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
H	1,500	\$1,450	.....	..
F	2,000	1,750	.....	30
K	3,000	2,100	.....	..
G	4,000	2,500	.....	..

International Motor Co., New York City.				
Model	Cap.	Chas. Price	Comp.	Page
AB	2,000	\$2,400	.....	31
AB	2,000	2,400	.....	31
AB	3,000	2,800	.....	33
AB	3,000	2,800	.....	33
AB	4,000	3,000	.....	36
AB	4,000	3,000	.....	36
AC	7,000	4,250	.....	43
AB	10,000	3,100	.....	45
AC	11,000	4,750	.....	47
AC	14,000	4,250	.....	47
AC	15,000	5,000	.....	48
AC	22,000	4,750	.....	48
AC	30,000	5,000	.....	48

Kearns Motor Car Co., Beavertown, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
D	1,000	.....	\$850	25

The Kelly-Spring M. T. Co., Springfield, O.				
Model	Cap.	Chas. Price	Comp.	Page
K31	3,000	\$2,500	.....	33
K32	3,000	2,500	.....	33
K35	5,000	3,000	.....	39
K36	5,000	3,000	.....	39
K40	7,000	3,850	.....	42
K45	8,000	4,000	.....	44
K60	10,000	4,600	.....	45
K60	12,000	4,750	.....	47

Kentucky Wagon Mfg. Co., Louisville, Ky.				
Model	Cap.	Chas. Price	Comp.	Page
M	1,500	\$875	.....	29

King, A. R., Mfg. Co., Kingston, N. Y.				
Model	Cap.	Chas. Price	Comp.	Page
..	7,000	\$3,000	.....	42

Kissel Motor Car Co., Hartford, Wis.				
Model	Cap.	Chas. Price	Comp.	Page
..	1,500	\$1,285	.....	29
..	2,500	1,885	.....	32
..	4,000	2,575	.....	36
..	7,000	3,550	.....	42

Kielber & Co., Inc., San Francisco, Cal.				
Model	Cap.	Chas. Price	Comp.	Page
AA	2,000	\$2,100	.....	30
A	3,000	2,500	.....	33
BB	4,000	2,750	.....	36
F	5,000	3,200	.....	39
C	7,000	3,850	.....	42
D	10,000	4,900	.....	45

Knox Motors Associates, Springfield, Mass.				
Model	Cap.	Chas. Price	Comp.	Page
35	20,000	.....	\$5,000	48
36	20,000	.....	5,500	48

Koehler Motor Corp., H. J., Newark, N. J.				
Model	Cap.	Chas. Price	Comp.	Page
K	2,500	\$1,150	.....	32
KT	6,000	1,550	.....	..

Kuhn Tractor Truck Co., Seattle, Wash.				
Model	Cap.	Chas. Price	Comp.	Page
KTT	10,000	\$5,000	.....	45

Lamson Truck & Tractor Co., Chicago, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
..	3,000	\$1,850	.....	33

Lane Motor Truck Co., Kalamazoo, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
F	3,000	\$1,850	.....	33

Lange Motor Truck Co., Pittsburgh, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
C	3,000	\$1,950	.....	33

Lapeer Tractor Truck Co., Lapeer, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
A	6,000	\$1,750	\$1,750	40

Larrabee-Deyo M. T. Co., Hinghamton, N. Y.				
Model	Cap.	Chas. Price	Comp.	Page
M	2,000	\$1,800	.....	30

Lawson Mfg. Co., Pittsburgh, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
35	1,000	.....	.....	28

Lewis-Hall Iron Works, Detroit, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
..	4,000	\$2,350	.....	36
..	7,000	3,250	.....	42
..	10,000	4,200	.....	45
..	10,000	.....	.....	45

Lippard-Steward M. Car Co., Buffalo, N. Y.				
Model	Cap.	Chas. Price	Comp.	Page
C	1,500	\$1,900	.....	29
D	1,500	1,900	.....	29
H	2,000	2,250	.....	31
F	3,000	2,750	.....	33
G	4,000	3,050	.....	36

Locomobile Co. of A., The, Bridgeport, Conn.				
Model	Cap.	Chas. Price	Comp.	Page
B	6,000	.....	.....	40
BB	8,000	.....	.....	44

Maccar Truck Co., Scranton, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
L	3,000	\$2,400	.....	33
H	5,000	2,950	.....	39
M	7,000	3,600	.....	42
U	11,000	4,500	.....	47

Martin Truck & Body Corp., York, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
18	1,500	\$885	.....	28

Master Trucks, Inc., Chicago, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
M	4,000	\$1,990	.....	37

Maxer Truck & Tractor Co., Chicago, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
..	2,000	\$1,195	.....	31

Maxwell Motor Co., Detroit, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
..	2,000	\$985	.....	..

Menominee Motor T. Co., Menominee, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
EW	1,500	\$1,650	.....	29

O'Connell-Manly Truck Co., Chicago, Ill.			
Model	Cap.	Chas. Price	Comp. Price
30	3,000	\$2,050	33
40	4,000	2,250	37
50	5,000	2,600	39
60	6,000	3,250	40

Old Reliable Motor T. Co., Chicago, Ill.			
Model	Cap.	Chas. Price	Comp. Price
Worm	3,000	\$1,950	34
Worm	4,000	2,500	39
Chain	5,000	2,750	39
Worm	6,000	3,250	39
Worm	8,000	3,750	44
Worm	10,000	4,250	47
Chain	6,000	3,250	40
Chain	8,000	3,750	40
Chain	10,000	4,250	47
Chain	14,000	5,000	47
Chain	14,000	4,750	47
Chain	20,000	3,850	47
..	12,000	4,500	47

Onida Motor Truck Co., Green Bay, Wis.			
Model	Cap.	Chas. Price	Comp. Price
A	2,000	\$2,290	31
B	3,000	2,650	34
C	4,000	3,000	37
D	7,000	3,600	43

Packard Motor Car Co., Detroit, Mich.			
Model	Cap.	Chas. Price	Comp. Price
1E	2-2500	\$2,450	32
1½E	3-3500	2,800	34
2E	4-5000	3,200	37
3E	6-7000	3,900	40
4E	8-9000	4,375	44
5E	10-11,000	4,900	46
6E	12-13,000	5,150	47

Packard Motor T. Co., Minneapolis, Minn.			
Model	Cap.	Chas. Price	Comp. Price
..	500	\$300	28

Palmer-Meyer M. C. Co., St. Louis, Mo.			
Model	Cap.	Chas. Price	Comp. Price
..	2,000	\$1,650	31
..	4,000	2,595	37

Pan-American M. T. Co., Decatur, Ill.			
Model	Cap.	Chas. Price	Comp. Price
C	4,500	\$1,900	39

Peerless Motor Car Co., Cleveland, O.			
Model	Cap.	Chas. Price	Comp. Price
TC3	6,000	\$4,000	40
TC4	8,000	4,150	44
TC5	10,000	4,700	46
TC6	12,000	5,200	47

Phoenix Mfg. Co., Eau Claire, Wis.			
Model	Cap.	Chas. Price	Comp. Price
Phoenix C	48

Pierce-Arrow M. Car Co., Buffalo, N. Y.			
Model	Cap.	Chas. Price	Comp. Price
R8	10,000	\$5,500	46
X4	4,000	3,750	37

Pull-More Motor T. Co., Pittsburgh, Pa.			
Model	Cap.	Chas. Price	Comp. Price
..	6,000	\$3,950	40

Rainier Motor Corp., Flushing, N. Y.				
Model	Cap.	Chas. Price	Comp. Price	Page
R1	1,000	\$995	\$1,110-\$1,145	28
R2	1,500	1,150	1,315- 1,240	..
R4	2,500	1,350	1,525- 1,600	32

Renner-Leslie Motor Co., Philadelphia, Pa.			
Model	Cap.	Chas. Price	Comp. Price
Tractor	6,000	\$3,250	40
..	5,000	3,250	39

Reo Motor Car Co., Lansing, Mich.				
Model	Cap.	Chas. Price	Comp. Price	Page
F	1,500	\$1,100	\$1,175	29
J	4,000	1,800		37

Republic Motor		Truck Co., Alma, Mich.		
Model	Cap.	Chas. Price	Comp.	Page
Rep. Dis.	1,500	.....	\$895-\$920	29
Rep. Spe.	1,500	\$995	.....	29
10	2,000	1,235	1,295	31
11X	3,000	1,650	.....	34
A	4,000	1,975	.....	37
T	7,000	2,950	.....	43
V	10,000	4,250	.....	46

Reya Co., Napoleon, O.				
Model	Cap.	Chas.	Price	Comp. Page
18	2,000		\$995	31

Rowe Motor T. Co., Downingtown, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
CDW	4,000	\$2,800	.....	37
CDW	5,000	3,000	.....	39
DEW	6,000	3,400	.....	40
GW	10,000	4,500	.....	46

Royal M. T. Co. of N. Y., New York.			
Model	Cap.	Chas. Price	Comp. Price
B1	2,000	\$1,850	..... 31
B1½	3,000	2,100	..... 34
B2	4,000	2,500	..... 37
B2½	5,000	2,850	..... 39

A3½	7,000	3,600	..	43
A5	10,000	4,500	..	46
A6	12,000	4,800	..	47
A7	14,000	5,000	..	47

Rush Motor T. Co., Philadelphia, Pa.				
Model	Cap.	Chas. Price	Comp.	Page
D	1,000	\$895		28

D	1,000	\$895	.....	28
Sadow Motor Truck Co., Chicago, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
A	2,000	\$1,650	.....	31
B	3,000	2,075	.....	34
D	4,000	2,650	.....	37
E	7,000	3,750	.....	42

E	7,000	3,750	.....	43
Sanford Motor Truck Co., Syracuse, N. Y.				
Model	Cap.	Chas. Price	Comp.	Page
W15	3,000	\$2,200	.....	34
W25	5,000	2,900	.....	39
W35	7,000	3,600	.....	43
W50	10,000	4,600	.....	46

Model	Cap.	Chas. Price	Comp. Price	Page
..	4,000	\$2,950	.....	37
..	5,000	3,300	.....	39
..	7,000	3,700	.....	43
..	10,000	4,700	.....	46

..	10,000	4,700	.....	46
Schleicher Motor Vehicle Co., N. Y. C.				
Model	Cap.	Chas. Price	Comp. Price	Page
..	6,000	\$3,500	.....	40
..	10,000	4,500	.....	46

Selden Motor V. Co., Rochester, N. Y.				
Model	Cap.	Chas. Price	Comp.	Page
G	1,500	\$1,075	.....	29
TXL	2,000	1,550	.....	31
TL	2,000	1,850	.....	31
JC	4,000	2,550	.....	37
JWL	4,000	2,550	.....	37
NL	7,000	3,400	.....	43

Model	Cap.	Chas. Price	Comp.	Page
220	2,000	\$1,900	.....	31
230	3,000	2,550	.....	34
240	4,000	2,750	.....	37
270	7,000	3,600	.....	43
275	7,000	3,900	.....	43
300	10,000	4,600	.....	46

Signal Motor Truck Co., Detroit, Mich.				
Model	Cap.	Chas. Price	Comp. Price	Page
F	2,500	\$1,875	.....	32
H	3-2,500	2,375	.....	34
J	5,000	2,835	.....	39
M	8,000	3,825	.....	44
R	10,000	4,475	.....	46

Standard Motor Truck Co., Detroit, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
70	4,000	\$2,575	.....	38
65	7,000	3,350	.....	43
85	10,000	4,250	.....	46

W. M. Steele, Worcester, Mass.				
Model	Cap.	Chas. Price	Comp.	Page
A	10,000	\$4,000	.....	46
B	6,000	3,000	.....	41
BA	8,000	3,500	.....	44
C	4,000	2,250	.....	38

Sterling Truck S. Co., Milwaukee, Wis.				
Model	Cap.	Chas. Price	Comp.	Page
..	5,000	\$2,950	.....	39
..	7,000	4,250	.....	43
..	10,000	5,000	.....	46
..	14,000	5,500	.....	47

..	14,000	5,500	.....	47
Stewart Motor Corp., Buffalo, N. Y.				
Model	Cap.	Chas. Price	Comp.	Page
6A	1,500	\$750	\$875	29
6B	1,500	750	840	29
6C	1,500	750	848	29
6D	1,500	750	848	29

6D	1,500	750	848	29
8B	2,000	1,295	1,445	31
8C	2,000	1,295	1,420	31
8D	2,000	1,295	1,435	31
9C	2,000	1,695	1,845	34
9D	3,000	1,695	1,870	34
7D	4,000	2,395	2,395	38

FD	4,000	2,195	2,395	38
Sindebaker Corp. of A. South Bend, Ind.				
Model	Cap.	Chas. Price	Comp. Price	Page
SF	1,000	\$945	.....	28
7	2,000	1,300	.....	31
Snellman Motor T. Corp., Rochester, N. Y.				

Model	Cap.	Chas. Price	Comp.	Page
F	3,000	\$2,150	.....	34
E	4,000	2,600	.....	38
Superior Motor Truck Co., Atlanta, Ga.				
Model	Cap.	Chas. Price	Comp.	Page
A	2,000	\$1,500	.....	31

C	4,000	2,000	.....	38
Taylor Motor Truck Co., Fremont, O.				
Model	Cap.	Chas. Price	Comp. Price	Page
..	2,000	\$1 750	.....	31
..	3,000	2,200	.....	34
O3	4,000	2 250	.....	35

..	5,000	2,900	..	39
D3	7,000	2,600	..	41
..	7,000	3,650	..	43
..	10,000	4,600	..	46

..	10,000	4,600	.....	46
Tegetmeyer & Riepe, New York City.				
Model	Cap.	Chas. Price	Comp.	Page
M	3,000	\$2,200	.....	34
N	4,000	2,600	.....	37

N	4,000	2,600	.....	37
Tiffin Wagon Co., Tiffin, O.				
Model	Cap.	Chas. Price	Comp.	Page
A	1,500	\$1,190	.....	29
AW	2,000	1,150	.....	32
GW	3,000	1,970	.....	34
MC	5,000	2,500	.....	39
MW	5,000	2,700	.....	39
PW	7,000	3,400	.....	43
RW	10,000	4,550	.....	45
SW	12,000	4,650	.....	47

Titan Truck Co., Milwaukee, Wis.			
Model	Cap.	Chas. Price	Comp. Price
..	10-12,000	\$5,000	46
..	10-12,000	4,900	46

Tower Motor Truck Co., Greenville, Mich.				
Model	Cap.	Chas.	Price	Comp. Page
D	3,000	.....	.....	..
E	5,000	.....	.....	39

Transport Tractor Co., L. I. C., N. Y.				
Model	Cap.	Chas. Price	Comp. Price	Page
Trans. T.	10,000	\$2,750	.....	46

Triangle Motor T. Co., St. Johns, Mich.			
Model	Cap.	Chas. Price	Comp. Price
A	3,000	.....	.....

Turnbull M. T. & W. Co., Defiance, O.			
Model	Cap.	Chas. Price	Comp. Price
A	3 000	\$1 595	..

A	3,000	\$1,595	.....	32
Twinn City, F. W. D. Co., St. Paul, Minn.				
Model	Cap.	Chas. Price	Comp. Price	Page
	7,000	\$4,000		44

Union Motor Truck Co., Bay City, Mich.			
Model	Cap.	Chas. Price	Comp. Price
B	5,000	\$2,075	\$

H. E. Wilcox M. Co., Minneapolis, Minn.				
Model	Cap.	Chas. Price	Comp.	Page
S	2,000	.....	.....	32
X	3,000	.....	.....	34
Q	4,000	.....	.....	38
P	7,000	.....	.....	44
W	10,000	.....	.....	47
Willys-Overland, Inc., Toledo, O.				
Model	Cap.	Chas. Price	Comp.	Page
90	800	\$745	\$810	28
90	800	745	785	..
..	1,200	880	930	28
Willson Co., J. C., Detroit, Mich.				
Model	Cap.	Chas. Price	Comp.	Page
E	4,000	\$2,550	.....	38
G	7,000	3,250	.....	44
H	10,000	.....	.....	47
Winther M. T. Co., Winthrop Harbor, Ill.				
Model	Cap.	Chas. Price	Comp.	Page
48	4,000	\$3,000	.....	38
68	6,000	3,600	.....	41
88	8,000	4,200	.....	44
108	10,000	5,000	.....	47
128	12,000	5,250	.....	47
148	14,000	5,500	.....	48
Witt-Will Co., Washington, D. C.				
Model	Cap.	Chas. Price	Comp.	Page
WD16	2,000	\$2,000	.....	22
WD18	5,000	2,500	.....	49

POLACK TIRE SALES ORGANIZATION CHANGES.

The Polack Tyre and Rubber Co., New York City, has announced a number of changes in its sales organization. T. J. Manning, for 15 years with the Glibney Tyre and Rubber Co. as manager of its solid tire business at Philadelphia, has been appointed manager of the Polack branch in Philadelphia.

H. E. Heyder, for a number of years manager of the Polack branch in Brooklyn, N. Y., has been promoted to be manager of western factory sales, with headquarters in Detroit.

The Polack branch opened on the first of the year at Buffalo, N. Y., with a service station at 1474 Main street, is under the management of George M. Kraus, who was connected with the Atterbury Motor Truck Co. as purchasing agent for a long time.

KISSEL RELEASED FROM CONTRACT.

The contract for 500 class B heavy duty war trucks, awarded to the Kissel Motor Car Co., Hartford, Wis., has been transferred to the Garford Motor Truck Co. The Kissel company was released from the contract owing to its urgent need of all manufacturing facilities for production on more recent contracts for four-wheel drive trucks.

FOREIGN TRADE CONVENTION.

The Fifth National Foreign Trade Convention, under the auspices of the National Foreign Trade Council, will be held at the Gibson hotel, Cincinnati, O., April 18, 19 and 20. The theme of the convention will be "The Part of Foreign Trade in Winning the War."

TO SELL WISCONSIN TRACTORS.

The Brewer-Mosel Automobile Co., Madison, Wis., will handle the entire output of the Wisconsin Farm Tractor Co. of that city. The Wisconsin tractor is a dual service type and draws a four-bottom plow or can be used as a general plant about the farm.

"BEARING ENGINEERING TALKS."

"Bearing Engineering for Tractor Designers" is the title of a booklet published by the Hyatt Roller Bearing Co., that will be distributed from the Chicago office of the Tractor Sales Department of the company at request. The contents consists of a series of engineering talks that appeared successively for 12 months in trade papers, and are replete with valuable data for tractor engineers, a fact evidenced by the very large demand for reprints as the articles appeared.

Instead of sending them in loose leaf reprint form the company reprinted them with diagrams, illustrations and blank memorandum pages in a booklet. Each article is signed by C. M. Eason, manager of the tractor sales department of the company, whose knowledge of and application to the subject of tractor designing is well known to the industry's engineers.

The articles are entitled "The Advantages of Roller Over Plain Bearings," "The Meaning and Value of Flexibility," "Direct on Shaft Operation," "Relation of Shaft Hardness to Capacity," "The Advantages of One Purpose Bearings," "The Principle of Hyatt Roller Construction," "Bearings for High Speeds," "The Ability to Meet Varying Conditions," "The Value of Bearing Length," "Coefficient of Friction and Durability," "The Ideal Bearing."

RELIANCE WILL BUILD PLANT.

The Reliance Motor Truck Co., Racine, Wis., has awarded contracts for a new plant at Appleton, Wis., where the company will soon locate. The first unit of the new plant will have about 22,500 square feet of floor space and will cost about \$50,000. It will be ready for occupancy about April 1 and production will be under way by the middle of May. The equipment and machinery in the Racine factory will be moved to the new plant.

WISCONSIN MOTOR GROWTH.

The Wisconsin Motor Manufacturing Co., Milwaukee, Wis., with increase of capital to \$1,000,000 and a large addition to the plant that is used mainly for assembling engines, is better prepared than ever before to meet the demands of the industry. The addition is devoted to the sub-assembly and final assembly departments, a shipping department and a stock room. The total floor space is 43,520 feet, about an acre, the assembly room has 28,003 square feet of floor area. The former assembly department has been converted into a machine shop. A brass foundry, having 3000 square feet of floor space, has been equipped and is now in operation. The new buildings, which quadruple the capacity of the plant, are well lighted and ventilated and are to the most advanced ideas of manufacturing construction. Statement is made that the plant is one of the best equipped in the industry.

In the final assembly room is a monorail system with which engines are taken from the stands by electric hoists and conveyed to the testing department. Each test stand has an individual electric motor generator unit, and when an engine has been assembled it is taken to the test room to be run in with electric motors until it is free to run under its own power. After this it is operated under full load for several hours. It is then hoisted by an electric crane and taken to the final inspecting room, where it is completely disassembled and all moving parts inspected and adjusted. It is then placed on a test stand and run for several hours before it is sent to the shipping department.

The plant is equipped with a sprinkler system. In the new power plant is a 300 K. W. generator, which furnishes the electric energy that operates the works. Wisconsin engines are four-cycle, built with four, six and 12 cylinders, and are designed for trucks, tractors, passenger cars, power boats and aeroplanes. The manufacturer will furnish full description upon request.



Section of the Assembling Department of the Plant of the Wisconsin Motor Manufacturing Co., Milwaukee, Wis., Showing Engines on Stands in Different Stages of Completion.

GASOLINE SPECIFICATION DEFINITIONS

In compiling the specifications of gasoline-engined wagons, trucks and tractors built by American manufacturers numerous abbreviations are necessarily used to economize space. That all readers may thoroughly comprehend the details the terms applied are defined to whatever length is desirable.

The Society of Automotive Engineers has a nomenclature which is uniformly used by its members, and is generally applied technically to designate the different constructional units of automobile chassis by manufacturers, service organizations and salesmen.

Because the public generally does not use this nomenclature and yet may be reasonably familiar with automobile vehicles, a series of abbreviations has been adopted that is sufficient for all purposes of descrip-

tion in the manner presented. As the specifications must necessarily include a very large number of terms the reader should understand the definitions clearly. The arrangement of the specification is systematic in that it begins with the engine and follows through the chassis, including the clutch, transmission gearset, method of drive, rear axle, wheels, tires and means of control in regular order.

One will note that the specifications are given in the order of load capacity and alphabetically by manufacture. The directory will give the name of any vehicle not known by the manufacturer's name, and the price list will afford quick reference to any page on which a specification appears. The definitions follow:

MAKE—The trade or market name by which the chassis is known.

MODEL—This indicates the figures or letters by which the sizes are differentiated by the maker. In some instances there is no indication.

CAPACITY—This states the maximum load capacity in pounds, and assumes that the body weight will be carried in addition.

CHASSIS PRICE—The manufacturers have been asked to carefully revise these quotations. In some instances, where complete vehicle prices are given, these are so stated.

S. A. E. RATING—This gives the horsepower as found by the standard formula, which is the same as the A. L. A. M. and the N. A. C. C. formulae. In most instances these ratings will be increased in practical service, in some cases in excess of 40 per cent.

ENGINE CYLINDERS—This gives the number only and without exception these are all four-cycle. The type, whether I, head, T head or L head, is not indicated.

HOW CAST—This specifies whether the cylinders are cast singly, in pairs, in triple units or in block form, but does not indicate the manner of casting the crank cases. In all instances where the cooling is by water the cylinder jackets are cast integral.

BORE-STROKE—This specifies the cylinder bore and the piston stroke in inches.

VALVE LOCATION—This specifies the side of the engine on which the valves are located, this construction requiring but a single camshaft, but where the term T head is used this means that the valves are on either side, but the exhaust and intake are not differentiated.

NUMBER MAIN BEARINGS—This does not indicate the type of bearings, but as a rule these are plain, annular ball bearings, being very rarely used.

MAXIMUM R. P. M.—This states the highest or maximum engine speed claimed by the manufacturer. The vehicles or engines may be governed to considerably lower speeds.

LUBRICATION—Splash, defines a simple splash system without pump; splash and pressure, defines a system where the oil is supplied by pumpage and distributed in part by splash; pressure, defines any system where the lubricant is supplied wholly by pumpage; fuel, where the oil is mixed with the gasoline and injected through the carburetor.

COOLING SYSTEM—Water thermo, indicates cooling by a thermo-siphon system of water circulation; water pump, by a forced or pressure water circulation; in both instances through radiators; air, cooling by forced circulation of air.

RADIATOR—Tubular indicates any form of plain tube; fin. T. cast, any form of finned tube cooling section and cast top and bottom tanks; fin. T. sheet, for finned tube cooling section and sheet metal tanks; cell. cast., for cellular cooling section and cast metal tanks; cell. sheet, for cellular cooling section and sheet metal tanks; honeycomb and zig-zag tube cooling sections are classified as cellular.

CARBURETOR—The makers' name, and, in some instances the type, is given.

IGNITION—The name of the maker of the system, usually a magneto, and in some instances the type, is given.

CONTROL—This refers to the control of the ignition system, fixed indicating a fixed point for firing the cylinders; hand, for manual adjustment of the firing point, and auto, for automatic advance of retardation.

GOVERNOR—This specifies the manner of driving a governor, if this equipment is included, whether from the engine, gear set or vehicle wheel.

SPEED, M. P. H.—This specifies the maximum vehicle speed with the highest gear ratio.

CLUTCH TYPE—The designations are cone, which may be either fabric faced or metal to metal; dry disc (multiple disc) or dry plate which are used without lubricant; wet disc, which is used with lubricant; expanding shoe or contracting band.

TRANSMISSION GEARSET—This specifies whether selective, progressive, planetary or friction type.

LOCATED, SPEEDS—This indicates the location of the transmission gearset, Unit M as a unit with the engine; Unit A as a unit with the rear axle; Amid, as amidships, or independent of the engine or axle, and the numeral gives the number of forward speed ratios.

DRIVEN BY—Top worm, defines the David Brown type construction of worm shaft and worm wheel; int. gear, defines internal gear drive; bevel, defines bevel pinion and master gear; double chain, defines double side chains; double red., defines double reduction gearing; front worm, defines front wheels driven by worm shaft and worm wheel; front int. gear, defines front wheels driven by internal gears; four worm, defines four wheels driven by worm shafts and worm wheels; four int. gear, defines four wheels driven by internal gears; four bevel, defines four wheels driven by bevel gears.

RATIO GEAR REDUCTION—Specifies the reduction from the engine to the rear wheels when driven with the high gear ratio.

TORQUE TAKEN BY—This indicates whether the torque is taken by the springs, torque arm or member, torsion rods, radius rods or sub-frame.

PROPELLED BY—This defines whether the driving effort is given through the springs, torque member or radius rods.

SPRINGS FORWARD—This gives $\frac{1}{2}$ -ell. for semi or half-elliptical; elliptic for full elliptical; cross $\frac{1}{2}$ ell. for transverse semi-elliptical.

SPRINGS, REAR—This gives $\frac{1}{2}$ -ell. for semi or half-elliptical; elliptic for full elliptical; platform for two longitudinal and one transverse semi-elliptic springs; cantilever for semi-elliptical installed to give cantilever suspension; $\frac{3}{4}$ -ell. for three-quarters elliptical, and jack is added for an auxiliary or cross spring.

WHEELBASE—Chassis length in inches between centres of front and rear axles.

TIRE TYPE—Pneu. for pneumatic; solid for cushion or solid bands; P. and S. for pneumatic and solid or mixed equipment, opt. for optional equipment.

TIRE SIZES—The forward tire sizes are given first and the rear last, with d added to the rear sizes to indicate dual shoes.

DRIVER'S SEAT—Right or left indicates the side of the chassis at which the seat and steering column are located.

CONTROL LEVERS—Right, left or centre, define the location of the gear shifting and emergency brake hand levers.

The Specifications of the Vehicles in Bold Face Are Included in This Issue.

A. & B.	American and British Manufacturing Co.,	Providence, R. I.
A. & R.	Abendroth & Root Manufacturing Co.,	Newburgh, N. Y.
Acson	Acson Motor Truck Co.,	Detroit, Mich.
Acme	Acme Truck Co.,	Cadillac, Mich.
Alr-O-Flex	Alr-O-Flex Motor Corporation,	Detroit, Mich.
American	American Motor Truck Co.,	Detroit, Mich.
Amston	Amston Motor Truck Corporation,	New York City.
Armleder	O. Armleder Co.,	Cincinnati, O.
Atlas	Martin Truck & Body Corp.,	York, Pa.
Atterbury	Atterbury Motor Car Co.,	Buffalo, N. Y.
Autocar	Autocar Co.,	Ardmore, Pa.
Auto Truck	Auto Truck Co.,	Hangor, Pa.
Available	Available Truck Co.,	Chicago, Ill.
Barber	Barber Motors Truck Corporation,	Brooklyn, N. Y.
Barke	Parker Factory, The	Norwalk, Conn.
Bauer	Bauer Machine Works Co.,	Kansas City, Mo.
Beck-Hawkeye	Beck-Hawkeye Motor Truck Works,	Cedar Rapids, Ia.
Beech Creek	Beech Creek Truck and Auto Co.,	Beech Creek, Pa.
Bell	Bell Motor Car Co.,	York, Pa.
Besemer	Besemer Motor Truck Co.,	Grove City, Pa.
Bethlehem	Bethlehem Motor Corp.,	Allentown, Pa.
Bimcl	Bimcl Buggy Co.,	Sidney, O.
Blair	Blair Motor Truck Co.,	Newark, O.
Bollstrom	Bollstrom Products Sales Co.,	Battle Creek, Mich.
Bourne	Bourne Magnetic Truck Co.,	Philadelphia, Pa.
Brinton	Brinton Motor Truck Co.,	Philadelphia, Pa.
Briscoe	Briscoe Motor Co.,	Jackson, Mich.
Brockway	Brockway Motor Truck Co. of Cortland,	Homer, N. Y.
Brown	Brown Carriage Co.,	Cincinnati, O.
Boyd	Jas. Boyd & Bro., Inc.,	Philadelphia, Pa.
Bucklen	H. E. Bucklen, Jr., Motor Truck Co.,	Flint, Mich.
Buick	Buick Motor Co.,	Flint, Mich.
Burford	Taylor Motor Truck Co.,	Fremont, O.
Carlton	Carlton Hill Motor Car Co.,	Rutherford, N. J.
Carroll	Carroll Motor Car Co.,	Strassburg, Pa.
Casey	F. A. Casey,	Ellerica, Mass.
Champion	Champion Motors Co.,	Fulton, Ill.
Chase	Chase Motor Truck Co.,	Syracuse, N. Y.
Clyde	Clyde Cars Co.,	Clyde, O.
Clyde	Clyde Cars Co.,	Illion, N. Y.
Coleman	Coleman Carriage and Harness Co.,	Painesville, O.
Collier	Collier Motor Truck Co.,	Pontiac, Mich.
Columbia	Columbia Motor Truck and Trailer Co.,	Rochford, Ill.
Comet	Comet Motor Truck Co.,	Detroit, Mich.
Commerce	Commerce Motor Car Co.,	Concord, N. H.
Concord	Abbott & Downing Co.,	Chicago, Ill.
Continental (C)	Continental Motor Truck Co.,	Superior, Wis.
Continental (S)	Continental Truck Manufacturing Co.,	Henderson, N. C.
Corbitt	Corbitt Motor Truck Co.,	Corliss, Wis.
Corliss	Corliss Motor Truck Co.,	Grand Rapids, Mich.
Couple-Gear	Couple-Gear Freight Wheel Co.,	Asbury Park, N. J.
Croce	Croce Automobile Co.,	North Milwaukee,
Crown	Crown Commercial Car Co.,	Ottumwa, Ia.
Dain	Dain Manufacturing Co.,	Waterloo, Ia.
Dart	Part Motor Truck Co.,	Newark, N. J.
Day-Elder	Day-Elder Motors Co.,	Dayton, O.
Darton	Durable-Dayton Truck Co.,	DeKalb, Ill.
DeKalb	DeKalb Wagon Co.,	San Francisco, Cal.
De Martini	De Martini Motor Truck Co.,	Philadelphia, Pa.
Denby	Denby Motor Truck Co.,	Detroit, Mich.
Detroit	Detroit Commercial Car Co.,	Pontiac, Mich.
Defiance	Turnbull Motor Truck & Wagon Co.,	Defiance, O.
Diamond T.	Diamond-T Motor Car Co.,	Chicago, Ill.
Dispatch	Dispatch Motor Car Co.,	Minneapolis, Minn.
Doane	Doane Motor Truck Co.,	San Francisco, Cal.
Dorris	Dorris Motor Car Co.,	St. Louis, Mo.
Duplex	Duplex Truck Co.,	Lansing, Mich.
Durable	Durable Motor Truck Co.,	Hammond, Ind.
Duryea	Duryea Motors, Inc.,	Philadelphia, Pa.
Economy	Economy Motor Co.,	Tiffin, O.

Lansom	Lansom Truck & Tractor Co.,	Chicago, Ill.
Landover	Landover Motor Truck Co.,	Marquette, Wis.
Landshaft	William Landshaft & Sons,	Chicago, Ill.
Lane	Lane Motor Truck Co.,	Kalamazoo, Mich.
Lange	Lange Motor Truck Co.,	Pittsburgh, Pa.
Lapeer	Lapeer Tractor Truck Co.,	Lapeer, Mich.
Lawson	Lawson Manufacturing Co.,	Pittsburgh, Pa.
Larrabee	Larrabee-Deyo Motor Truck Co.,	Binghamton, N. Y.
Lenox	Lenox Motor Car Co.,	Boston, Mass.
Leselna	Leselna Automobile Co.,	Newark, N. J.
Lippard-Stewart	Lippard-Stewart Motor Car Co.,	Buffalo, N. Y.
Little Giant	Chicago Pneumatic Tool Co.,	Chicago, Ill.
	L. & B. Truck Mfg. Co.,	Los Angeles, Cal.
Maccar	Maccar Truck Co.,	Scranton, Pa.
Mack	International Motor Co.,	New York, N. Y.
Manly	O'Connell Manly Truck Co.,	Chicago, Ill.
Master	Master Trucks, Inc.,	Chicago, Ill.
Maxter	Maxter Truck & Tractor Co.,	Chicago, Ill.
Maxwell	Maxwell Motor Co.,	Detroit, Mich.
Menominee	Menominee Motor Truck Co.,	Menominee, Mich.
Metropolitan	Metropolitan Motors, Inc.,	Bronx, N. Y.
Mansur	Mansur Motors Co.,	Haverhill, Mass.
Mets	Metz Co.,	Waltham, Mass.
Midland	Midland Motor Car & Truck Co.,	Oklahoma City, Okla.
Modern	Modern Green Motor Car Co.,	Bowling Green, O.
Mogul	Mogul Motor Truck Co.,	St. Louis, Mo.
Mohawk	Mohawk Motor Truck Co.,	Ravenna, O.
Monitor	Monitor Automobile Works,	Janesville, Wis.
Moon	Mos. W. Moon Buggy Co.,	St. Louis, Mo.
Moore	Pacific Products Co.,	Torrence, Cal.
Moreland	Moreland Motor Truck Co.,	Los Angeles, Cal.
Morton	Morton Potter Motor Co.,	Beacon, N. Y.
Muskegon	Morton Truck and Tractor Co.,	Harrisburg, Pa.
	Muskegon Engine Co.,	Muskegon, Mich.
Nash	Nash Motors Co.,	Kenosha, Wis.
Nelson & LeMoon	Nelson & LeMoon,	Chicago, Ill.
Netco	New England Truck Co.,	Fitchburg, Mass.
New York	Tegetmeyer & Relp,	New York, N. Y.
Niles	Niles Car and Manufacturing Co.,	Niles, O.
Noble	Noble Motor Truck Co.,	Kendallville, Ind.
Oberlin	Oberlin Motor Truck Co.,	Pittsburgh, Pa.
Old Hickory	Oklahoma Manufacturing Co.,	No. Muskogee, Okla.
Old Reliable	Kentucky Wagon Manufacturing Co.,	Louisville, Ky.
Oneida	Old Reliable Motor Truck Co.,	Chicago, Ill.
Overland	Oneida Motor Truck Co.,	Green Bay, Wis.
	Willlys-Overland Co.,	Toledo, O.
Page	Page Buggy Co.,	Marshall, Mich.
Palce	Palce Motor Car Co.,	Detroit, Mich.
Packard	Packard Motor Car Co.,	Detroit, Mich.
Packer	Packer M. C. Manufacturing Co.,	Minneapolis, Mich.
Palmer	Palmer-Meyer Motor Car Co.,	St. Louis, Mo.
Panhard	Hamilton Motors Co.,	Grand Haven, Mich.
Pan-American	Pan-American Motor Truck Co.,	Detroit, Mich.
Paulding	Anchor Auto Co.,	St. Louis, Mo.
Peerless	Peerless Motor Car Co.,	Cleveland, O.
Pennsy	Pennsy Motor Car Co.,	York, Pa.
Phoenix	Phoenix Manufacturing Co.,	Eau Claire, Wis.
Phoenix Centipede	Phoenix Manufacturing Co.,	Buffalo, N. Y.
Pierce-Arrow	Pierce-Arrow Motor Car Co.,	Columbus, O.
Piercy	Hub Motor Truck Co.,	Racine, Wis.
Piggins	Piggins Bros. Motor Truck Co.,	York, Pa.
Pullman	Pullman Motor Car Co.,	Newcastle, Pa.
Pull-More	Pull-More Motor Co.,	
Racine	Racine Motor Truck Co.,	Racine, Wis.
Rainier	Rainier Motor Corp.,	New York City.
Regal	Regal Motor Car Co.,	Detroit, Mich.
Rennoc-Leslie	Rennoc-Leslie Motor Co.,	Philadelphia, Pa.
Reo	Reo Motor Car Co.,	Lansing, Mich.
Republic	Republic Motor Truck Co.,	Alma, Mich.

Elmira	Elmira Commercial Car Co.,	Elmira, N. Y.	Reya	Reya Co.,	Napoleon, O.
Ellsworth	Mills-Ellsworth Co.,	Keokuk, Ia.	Riker	Locomobile Company of America,	Bridgeport, Conn.
Erle	Erle Motor Truck Manufacturing Co.,	Erle, Pa.	Robinson	Golden West Motors Co.,	Sacramento, Cal.
Fageol	Fageol Motors Co.,	Oakland, Cal.	Rockford	Rockford Motor Truck Co.,	Rockford, Ill.
Famous	Famous Truck Mfg. Co.,	St. Josephs, Mich.	Rocco	Rocco Motor Co.,	Hannibal, Mo.
Fargo	Fargo Motor Car Co.,	Chicago, Ill.	Rowe	Rowe Motor Co.,	Downington, Pa.
Fawick	Fawick Motor Car Co.,	Stouff Falls, S. D.	Royal	Royal Motor Truck Co.,	New York, N. Y.
Federal	Federal Motor Truck Co.,	Detroit, Mich.	Rush	Rush Delivery Car Co.,	Philadelphia, Pa.
Forscher	Forscher Motor Truck Co.,	New Orleans, La.	Sandow	Sandow Truck Co.,	Chicago, Ill.
Four-Drive	Four-Drive Tractor Co.,	Big Rapids, Mich.	Sanford	Sanford Motor Truck Co.,	Syracuse, N. Y.
Franklin	Franklin Commercial Truck Co.,	Franklin, Pa.	Sawyer-Massey	Sawyer-Massey Co., Ltd.,	Hamilton, Ont., Canada
Ford	Ford Motor Co.,	Detroit, Mich.	Schleicher	Schleicher Motor Vehicle Co.,	New York, N. Y.
Frome	R. L. Frome Manufacturing Co.,	Sheboygan, Wis.	Selden	Selden Truck Sales Co.,	Rochester, N. Y.
Fulton	Fulton Motor Truck Co.,	Farmingdale, L. I., N. Y.	Seneca	Seneca Motor Truck Co.,	Fosteria, O.
F. W. D.	Four Wheel Drive Auto Co.,	Clintonville, Wis.	Service	Service Motor Truck Co.,	Wabash, Ind.
Gabriel	Gabriel Motor Truck Co.,	Lansing, Mich.	Sheridan	Sheridan Commercial Car Co.,	Harvey, Ill.
Garford	Garford Motor Truck Co.,	Cleveland, O.	Signal	Signal Motor Truck Co.,	Detroit, Mich.
Gary	Gary Motor Truck Co.,	Lima, O.	Sphinx	Sphinx Motor Car Co.,	York, Pa.
G. A. Schacht	G. A. Schacht Motor Truck Co.,	Indiana	Standard	Standard Motor Truck Co.,	Detroit, Mich.
Gay	S. G. Gay Co.,	Cincinnati, O.	Standard Tractor	Standard Tractor Co.,	Brocklyn, N. Y.
Gem	Gem Motor Car Corporation,	Ottawa, Ill.	Star	Star Motor Co.,	Cincinnati, O.
Geneva	Geneva Wagon Co.,	Grand Rapids, Mich.	States	States Motor Co.,	Kalamazoo, Mich.
Genix	Gerlinger Motor Car Co.,	Geneva, N. Y.	Steele	W. M. Steele,	Worcester, Mass.
G-M-C	General Motors Truck Co.,	Portland, Ore.	Sterling	Sterling Motor Truck Co.,	Buffalo, N. Y.
Gillette	Gillette Motor Truck Co.,	Clio, Mich.	Stewart (B)	Stewart Motor Corporation,	Buffalo, N. Y.
Globe	Globe Motor Truck Co.,	East St. Louis, Ill.	Stone	G. M. Stone Truck & Tractor Co.,	Texarkana, Tex.
Gramm-Bernstein	Gramm-Bernstein Motor Truck Co.,	Lima, O.	Studebaker	Studebaker Corporation,	Detroit, Mich.
Grant	Grant Motor Car Corporation,	Cleveland, O.	Sullivan	Sullivan Motor Truck Co.,	Rochester, N. Y.
Great Southern	Great Southern Automobile Co.,	Birmingham, Ala.	Superior	Superior Motor Truck Co.,	Atlanta, Ga.
Hahn	Hahn Motor Truck Co.,	Hamburg, Pa.	Taylor	Taylor Motor Truck Co.,	Fremont, O.
Hall	Lewis-Hall Iron Works,	Detroit, Mich.	Thomas	Consolidated Motors Corp.,	Schenectady, N. Y.
Hanger	C. F. Hanger Co.,	Cleveland, O.	Tiffin	Tiffin Wagon Co.,	Tiffin, O.
Hannibal	Hannibal Motor Car Co.,	Hannibal, Mo.	Titan	Titan Truck Co.,	Milwaukee, Wis.
Harrison	Robert Harrison Co.,	South Boston, Mass.	Toepfner	Toepfner Bros.,	Bay City, Mich.
Harvey	Harvey Motor Truck Co.,	Marion, Ill.	Tower	Tower Motor Truck Co.,	Greenville, Mich.
Haughton	Haughton Sulky Co.,	Stouff City, Ia.	Trabold	Trabold Motor Manufacturing Co.,	Johnstown, Pa.
Hawkeye	Hawkeye Truck Co.,	Moline, Ill.	Tractor	Tractor Producing Co.,	Buffalo, N. Y.
Henderson	Henderson Bros.,	Chicago, Ill.	Transport Tractor	Transport Tractor Co.,	Long Island City, N. Y.
Hendrickson	Hendrickson Motor Truck Co.,	San Francisco, Cal.	Triangle	Triangle Motor Truck Co.,	St. Johns, Mich.
Hewitt-Ludlow	Hewitt-Ludlow Auto Co.,	Milwaukee, Wis.	Triumph	Triumph Motor Truck Co.,	Indianapolis, Ind.
Hercules	Hercules Motor Truck Co.,	Grand Rapids, Mich.	Tulsa	Tulsa Automobile & Manufacturing Co.,	Tulsa, Okla.
Higraide	Higraide Motors Co.,	Seattle, Wash.	Union	Union Motor Truck Co.,	Winsor, Ont.
Hood	Hood Tractor Co.,	York, Pa.	United	United Motors Co.,	Bay City, Mich.
Hoover	Hoover Wagon Co.,	Wyandotte, Mich.	United F. W. D.	United Four Wheel Drive Co.,	Grand Rapids, Mich.
Horner	Detroit-Wyandotte Motor Co.,	New York, N. Y.	United States	United States Motor Truck Co.,	Chicago, Ill.
Hurlburt	Hurlburt Motor Truck Co.,	Chicago, Ill.	Universal	Universal Service Co.,	Cincinnati, O.
I-H-C	International Harvester Co. of America,	Port Huron, Mich.	Van Winkle	Van Winkle Motor Truck Co.,	Detroit, Mich.
Independent	Independent Motors Corp.,	Marion, Ind.	Velle	Van Winkle Motor Vehicle Co.,	Atlanta, Ga.
Indiana	Indiana Truck Co.,	Muncie, Ind.	Viall	Viall Motor Car Co.,	Moline, Ill.
Inter State	Inter State Motor Co.,	Ottumwa, Ia.	Vim	Vim Motor Truck Co.,	Chicago, Ill.
Iowa	Iowa Motor Truck Co.,	Cleveland, O.	Voltz	Vim Motor Truck Co.,	Philadelphia, Pa.
Jordan	Jordan Motor Car Co.,	Wichita, Kan.	Walter	Walter Motor Truck Co.,	Chicago, Ill.
Jones	Jones Motor Truck Co.,	Saginaw, Mich.	Warre	Walter Motor Truck Co.,	New York, N. Y.
Jumbo	Nelson Bros. Co.,	Charleston, W. Va.	Washington	Twin City Four Wheel Drive Co.,	St. Paul, Minn.
Kanawha	Kanawha Auto Truck Co.,	Beavertown, Pa.	Watson	Washington Motor Car Co.,	Hyattsville, Md.
Kearna	Kearns Motor Car Co.,	Springfield, O.	Way-Cleense	Watson Wagon Co.,	Canastota, N. Y.
Kelly-Springsfield	Kelly-Springsfield Motor Truck Co.,	Los Angeles, Cal.	Weier-Smith	Way-Cleense Co.,	Sandusky, O.
Kimball	Kimball Motor Truck Co.,	Kingston, N. Y.	West Coast	Weier-Smith Truck Co.,	Birmingham, Mich.
King	A. R. King Manufacturing Co.,	Hartford, Wis.	Western	West Coast Wagon Co.,	Tacoma, Wash.
Kissel	Kissel Motor Car Co.,	San Francisco, Cal.	White	Western Truck Manufacturing Co.,	Chicago, Ill.
Kleiber	Kleiber & Co., Inc.,	New York, N. Y.	White-Hickory	White Motor Co.,	Cleveland, O.
Knickerbocker	Knickerbocker Motor Truck Co.,	Springfield, Mass.	White-Hickory	White Hickory Manufacturing Co.,	Atlanta, Ga.
Knox	Knox Motors Associates,	Newark, N. J.	Wilcox	White Falls Motor Co.,	Wichita Falls, Tex.
Kochler	H. J. Kochler Motors Corp.,	Seattle, Wash.	Wilson	H. E. Wilcox Motor Co.,	Minneapolis, Minn.
Kuhn	Kuhn Tractor Truck Co.,	Anderson, Ind.	Winther	J. C. Wilson Co.,	Detroit, Mich.
Lambert	Buckeye Manufacturing Co.,		Witt-Will	Winther Motor Truck Co.,	Kenosha, Wis.
			Zimmerman	Myers Machine Co.,	Sheboygan, Wis.
				Witt-Will Co.,	Washington, D. C.
				Zimmerman Manufacturing Co.,	Auburn, Ind.

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINE WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 500, 800, 1000 POUNDS.

[illegible]

LOAD CAPACITY, 1000, 1200, 1500 POUNDS.

[illegible]

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 1500 POUNDS.

Make	Hoover	Kiesel	Lip. Stewart	Messinace	Metz 25	Modern	Old Hickory	Reo	Republ	Republ	Selden
Model	15-B	1500	C & D	EW	25	30	M	F	Diapatch	Speedai	G
Capacity	1500-2000	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Chassis Price	\$1375	\$1285	\$1900	\$1650	\$585	\$1800	\$875	\$1100	\$895c	\$995	\$1075
S. A. E. Rating	14.40	22.50	22.50	22.50	24.30	Four	Four	27.20	16.90	16.90	16.60
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast.	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	3 1/2 x 5	3 3/4 x 5 1/2	3 3/4 x 5 1/2	3 3/4 x 5	3 3/4 x 4	3 3/4 x 5	3 1/2 x 5	4 1/4 x 4 1/2	2 1/2 x 5	3 1/2 x 5	3 1/4 x 1/2
Valve Location	Right	Right	Left	Right	Enclosed	Three	Right	R. & H.	Right	Right	Right
No. Main Bear.	Three	Three	Three	Three	Three	Three	Two	Two	Two	Two	Two
Max. RPM	1175	1060	1200	1800	1800	2000	2000	2000	1260	1260	1260
Lubrication	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.
Cooling System	Pump	Cent. pump	Cent. pump	Thermo	Thermo	Centrifugal	Thermo	Centrifugal	Thermo	Thermo	Thermo
Radiator Type	Cell. sheet	Cell. sheet	Cell. sheet	Cellular	Tubular	Fin. cast	Cell. sheet	Fin. T. sheet	Cell. cast	Cell. cast	V tube
Carburetor	Schebler	Stromberg	Zenith	Stromberg	A. W. T.	Zenith	Carter	Johnson	Marvel	Marvel	Schebler
Ignition, Make	Stromberg	Elsemann	Elsemann	Elsemann	At. Kent	Dixie	Connecticut	Remy	Elsemann	Elsemann	Elsemann
Type, Control	Single, hand	Single, hand	Single, fixed	Single, hand	Throttle	Single	Single, hand	Single, hand	Single, fixed	Single, fixed	Motor
Governor Drive	Motor	Motor	Motor	Gear set	25	Optional	.....	.....	.....	.....	.....
Speed, MPH	18	22	25	25	.....	.....	16-20	22	20	20	20
Clutch Type	Dry disc	Cone	Cone	Dry disc	Friction	Dry disc	Cone	Dry disc	Dry disc	Dry disc	Dry plate
Trans. Gearset	Selective	Selective	Selective	Selective	Fiber grip	Selective	Selective	Selective	Selective	Selective	Selective
Locatrd Speeds	Unit-M. 2	Unit-M. 3	Unit-M. 3	Unit-M. 3	Seven	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 2
Driven by	Top worm	Revel	Hel. bevel	Top worm	Motor	Worm	Revel	Revel	Int. gear	Int. gear	Top worm
Ratio Gear Red.	6.50-1	4.58-1	5.08-1	6.00-1	.....	6.00-1	6.00-1	4.30-1	6.60-1	6.60-1	6.02-1
Tor. Taken by	Springs	Springs	Springs	Springs	.....	Springs	Torque tube	Torsion arm	Springs	Springs	Springs
Propelled by	Springs	Springs	Springs	Radius rod	.....	Springs	Torque tube	Springs	Springs	Springs	Springs
Springs, For	1/2 elliptic	1/4 elliptic	1/4 elliptic	1/2 elliptic	Elliptic	1/4 elliptic	1/2 elliptic	1/4 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/2 elliptic	Elliptic	1/4 elliptic	Scroll elliptic	1/4 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wherlbase	120 in.	135 in.	125, 135 in.	124 in.	108 in.	132 in.	112 in.	128 in.	110 in.	110 in.	110 in.
Tire Type	Pneumatic	Pneumatic	Pneumatic	Cushion	.....	Solid	Pneumatic	Pneumatic	Pneumatic	Pneumatic	Pneumatic
Tire Size	32x4, 33x4 1/2	32x4, 32x4	35x4 1/2, 35x4 1/2	34x3 1/2, 24x4	31x3 1/2, 31x3 1/2	34x3 1/2, 31x5	33x4, 33x4	34x4 1/2, 34x4 1/2	32x3, 32x4	32x3, 32x4	32x4, 33x4
Driver's Seat	Left	Left	Left	Left	.....	Left	Left	Left	Left	Left	Right
Control Levers	Centre	Centre	Centre	Centre	.....	Centre	Centre	Centre	Centre	Centre	Centre

LOAD CAPACITY, 1500, 1800, 2000 POUNDS.

Make	Stewart	Timb	White	Grant	Acme	Available	Barker	Beck	Bessemer	Brinley	Chase	Clydesdale
Model	6	A	G B B E	12	B	A 1	U	A	G	H	A	30
Capacity	1500	1500	1500	1800	2000	2000 to 3000	2000	2000	2000	2000	2000	2000
Chassis Price	\$750	\$1190	\$2300	\$1020	.....	\$1950	\$1800	\$1140	.....	\$1250	\$1725	.....
S. A. E. Rating	15.62	19.60	22.50	16.90	22.50	22.50	25.60	19.61	19.61	19.00	19.61	19.61
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast.	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	3 1/2 x 5	3 1/2 x 5	3 3/4 x 5 1/2	3 3/4 x 5	3 3/4 x 5	3 3/4 x 5	4x5	3 1/2 x 5	3 1/2 x 5	3 1/2 x 5	3 1/2 x 5 1/2	3 1/2 x 5
Valve Location	Left	Right	Right	Right	Left	Right	Left	.....	Right	Left	Right	Right
No. Main Bear.	Two	Three	Two	Three	Three	Three	.....	.....	Three	Two	Three	Three
Max. RPM	500	1000	.....	.....	1700	1200	1500	2000	1260	1200	1200	.....
Lubrication	Spl. pres.	Pressure	.....	Spl. pres.	Spl. pres.	Clr. spl.	Spl. pres.	Clr. spl.	Clr. spl.	Spl. pres.	Spl. pres.	Spl. pres.
Cooling System	Thermo	Cent. pump	Cent. pump	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo
Radiator Type	Fin. T. sheet	Cellular	Cellular	Cell. sheet	Fin. sheet	Cell. sheet	Cell. sheet	Cell. pressed	Cell. cast	Tubular	Fin. sheet	Tubular
Carburetor	Schebler	White	White	Carter	Rayfield	Stromberg	Stromberg	Stromberg	Zenith	Rayfield	Stromberg	Zenith
Ignition, Make	Perling	.....	.....	Bljor	Elsemann	Stromberg	Elsemann	Rosch	Dixie	Rosch	Rosch	Laurne
Type, Control	Fixed	Single, hand	H. T. M., hand	Single, hand	.....	Single, fixed	Single, auto	Dual	Single, hand	Single, hand	Single, fixed	Hand
Governor Drive	.....	Engine	.....	Shaft	Motor	.....	.....	Motor	.....	.....	Motor	Motor
Speed, MPH	25	18	.....	.....	20	18	27	18	21	20	18	.....
Clutch Type	Dry plate	Cone	Single	Dry P. disc	Dry plate	Dry disc	Dry plate	Dry disc	Dry disc	Dry disc	Disc	Cone
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Locatrd Speeds	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 4	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3
Driven by	Internal gear	Internal gear	Bevel	Int. gear	Worm	Top worm	Top worm	Int. gear	Int. gear	Top worm	Top worm	Top worm
Ratio Gear Red.	5.08-1	6.80-1	.....	5.33-1	7.75-1	7.00-1	.....	.....	7.00-1	7.00-1	7.80-1	7.75-1
Tor. Taken by	Springs	Springs	Springs	Springs	Springs	Springs	Springs	.....	Springs	Springs	Springs	Springs
Propelled by	Springs	Springs	Radius rod	Springs	Springs	Springs	Springs	1/4 elliptic	Springs	Springs	Springs	Springs
Springs, For	1/2 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic
Springs, Rear	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic	1/4 elliptic
Wherlbase	110 in.	110 in.	133 1/2 in.	115 in.	130 in.	132 in.	130 in.	104 in.	124 in.	125 in.	138 in.	134 in.
Tire Type	Pneumatic	Pneumatic	Pneumatic	Pneumatic	Solid	Solid	Solid	Solid	Solid, pneu.	Pneum. solid	Solid	Solid
Tire Size	32x4 1/2, 32x4	35x4 1/2, 25x4 1/2	34x4 1/2, 34x4 1/2	32x4, 32x4	34x3, 34x4	36x5 1/2, 36x5 1/2	34x3 1/2, 42x5	34x3 1/2, 34x4	34x3 1/2, 34x3 1/2	34x3 1/2, 34x4	34x3 1/2, 36x5	34x3 1/2, 34x4
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Right	Right
Control Levers	Centre	Centre	Centre & left	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 2000 POUNDS.

Make	Model	Capacity	Chassis Price	S. A. E. Rating	Engine Cyls.	How Cast	Bore, Stroke	Valve Location	No. Main Bear.	Max. RPM	Lubrication	Cooling System	Radiator Type	Carburetor	Ignition	Moke	Type, Control	Governor Drive	Speed, MPH	Clutch Type	Trans. Geomet.	Located Sprdls	Driven by	Ratio Gear Red.	Tor. Taken by	Propelled by	Springs, Rear	Wheelbase	Tire Type	Tire Sizes	Driver's Seat	Control Levers
Concord	B	2000	\$1750	19.61	Four	Block	2 1/2 x 5 1/2	Left	Three	2000	Pressure	Thermo	Fin. T. cast	Zenith	Elsemann	Single	Engine	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Continental	FL	2000	\$1750	22.50	Four	Block	3 1/2 x 5 1/2	Left	Three	2000	Spl. pres.	Cent pump	Fin. T. cast	Stromberg	Bosch	Single	Engine	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Corblitt	E	2000	\$1850	22.50	Four	Block	2 1/2 x 5	Left	Three	2000	Spl. pres.	Thermo	Cellular	Stromberg	Elsemann	Single, fixed	Motor	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dart	E	2000	\$1850	22.50	Four	Block	3 1/2 x 5 1/2	Right	Three	1800	Spl. pres.	Thermo	Cellular	Master	Elsemann	Single, fixed	Drive shaft	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
D-E	A	2000	\$1495	19.60	Four	Block	3 1/2 x 5	Left	Three	1800	Spl. pres.	Thermo	Fin. T. cast	Zenith	Elsemann	Single, fixed	Drive shaft	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Deuby	12	2000	.....	.....	.....	.....	.....	.....	.....	1375	Clr. spl.	Thermo	Cellular	Zenith	Elsemann	Single, fixed	Motor	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Diamond T	J 5	2000	\$2000	19.61	Four	Block	3 1/2 x 5	Right	Three	.....	Clr. spl.	Thermo	Cellular	Miller	Bosch	Single, fixed	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Federal	S	2000	\$1900	19.61	Four	Block	3 1/2 x 5 1/2	Right	Three	1245	Pressure	Water pump	Tube sheet	Fin. T. sheet	Zenith	Elsemann	Single, fixed	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ford	T. Truck	2000	\$600	22.50	Four	Block	3 1/2 x 4	Right	Three	1400	Spl. gravity	Thermo	Tube sheet	Sq. T. sheet	Ford	Zenith	Single, hand	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Forschler	A	2000	\$1900	19.61	Four	Block	3 1/2 x 5	Right	Three	1200	Spl. pres.	Centrifugal	Cell. sheet	Sq. T. sheet	Rayfield	Bosch	Single, fixed	Motor	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gabriel	C	2000	\$1750	27.20	Four	Block	4 1/2 x 5 1/2	Left	Three	1200	Force feed	Cent. pump	Cell. sheet	Sq. T. sheet	Rayfield	Bosch	Single, hand	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

LOAD CAPACITY, 2000 POUNDS.

Make	Gary	G. M. C.	Globe	Gramm-Bern,	Hlggrade	Independent	Indiana	I. H. C.	Kielber	Lambert	Larrabee
Model	F	21	A 1	.....	A18	F	T	F	A A	V2	M
Capacity	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Chassis Price	.....	.....	\$1425	\$1900	\$1800	\$1385	\$1800	\$1750	\$2100	\$1700	\$1800
S. A. E. Rating	22.50	22.50	19.61	22.50	19.60	19.60	19.61	19.61	22.50	29.00	22.50
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block	Single	Block
Bore, Stroke	3 1/2 x 5 1/2	3 1/2 x 5	2 1/2 x 5	3 1/2 x 5 1/2	3 1/2 x 5	3 1/2 x 5	3 1/2 x 5 1/2	3 1/2 x 5 1/2	3 1/2 x 5 1/2	4 1/2 x 5 1/2	3 1/2 x 5
Valve Location	Right	Right	Left	Left	Right	Right	Right	Right	Left	.....	Left
No. Main Bear.	Three	Three	Three	Three	Three	Three	Three	Three	Three	.....	Three
Max. RPM	1250	1380	1383	1300	1200	1350	1400	1350	1300	1500	1200
Lubrication	Spl. pres.	Clr. spl.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Splash	Spl. pres.	Spl. pres.	.....	Spl. pres.
Cooling System	Thermo	Centrifugal	Cent. pump	Cent. pump	Thermo	Thermo	Cent. pump	Centrifugal	Cent. pump	.....	Thermo
Radiator Type	Cellular	Fin. T. cast	Cell. sheet	Fin. T. cast	Cell sheet	Cell. sheet	Fin. T. cast	Fin. sheet	Cellular	.....	Fin. cast
Carburetor	Stromberg	Marvel	Master	Zenith	Zenith	Marvel	Stromberg	Holley	Schebler	.....	Schebler
Ignition, Moke	Elsemann	Elsemann	Elsemann	Elsemann	Elsemann	Elsemann	Elsemann	Bosch	Bosch	.....	Bosch
Type, Control	Fixed	Single, manual	Single	.....	Single, hand	Single, hand	Ind., manual	Single, hand	Single, manual	Single	Single, hand
Governor Drive	Monarch	Motor	Motor	Engine	Simplex	Motor	Motor	Motor	Motor	Motor	Motor
Speed, MPH	15	18	20	20	20	18	20	17	20	.....	18
Clutch Type	Dry disc	Dry disc	Dry plate	Dry disc	Dry disc	Dry disc	Dry plate	Dry disc	Dry disc	.....	Dry disc
Trans. Geomet.	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	.....	Selective
Located Speeds	Unit-M, 3	Unit-M, 3	Unit-M, 3	Unit-M, 3	Unit-M, 3	Unit-M, 3	Unit-M, 3	Unit-M, 3	Unit-M, 3	.....	Unit-M, 3
Driven by	Top worm	Top worm	Int. gear	Worm	Worm	Worm	Top worm	Int. gear	Top worm	.....	Top worm
Ratio Gear Red.	7.80-1	7.75-1	7.00-1	6.50-1	4.50-1	7.75-1	7.00-1	8.00-1	6.50-1	.....	6.50-1
Tor. Taken by	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	.....	Springs
Propelled by	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	.....	Springs
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic
Wheelbase	130 in.	136 in.	132 in.	124 in.	115 in.	128 in.	135 in.	128 in.	120 in.	.....	144 in.
Tire Type	Solid	Solid	Solid	Solid	Pneumatic	Solid	Solid	Solid	Solid	.....	Solid
Tire Sizes	34x3 1/2, 36x4	34x3 1/2, 34x4	34x3 1/2, 34x4	34x3 1/2, 34x4	34x5, 35x5	36x3, 36x4	34x3 1/2, 34x5	37x3 1/2, 37x4	34x3 1/2, 34x5	.....	34x3 1/2, 34x5
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Left	Right	Left	Left
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINE WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names. Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 2000 POUNDS.

Make	Model	Capacity	Chassis	Engine Cyls.	How Cast.	Bore, Stroke	Valve Location	No. Main Bear.	Max. RPM.	Lubrication	Cooling System	Radiator Type	Carburetor	Ignition	Make	Type, Control	Governor Drive	Speed, MPH.	Clutch Type	Trans. Gearset	Located	Driven by	Ratio	Gear Red.	Taken by	Propelled by	Springs	Front	Rear	Wheelbase	Tire Type	Tire Size	Driver's Seat	Control Levers	Centre	Palmer
Little Giant	15	2000	.....	.....	.....	.....	.....	.....	.....	Spl. pres.	Thermo	Cellular	Schebler	Eisemann	Single, hand	.....	.....	.....	15.8	Dry disc	Selective	Unit-M., 3	Top worm	7.00-1	Springs	.....	1/2 elliptic	1/2 elliptic	128 in.	Solid	34x3 1/2	34x5	Right	Centre	.....
Stewart	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	17%	Dry disc	Selective	Unit-M., 4	Worm	7.75-1	Springs	.....	1/2 elliptic	1/2 elliptic	144 in.	Solid	36x4	.....	.....	.....	.....
Lip. Stewart	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	Spl. pres.	Thermo	Cell. sheet	Stromberg	Eisemann	Single, hand	.....	.....	.....	18	Speed, MPH.	Cone	.....	.....	.....									

LOAD CAPACITY, 2000 POUNDS.

[illegible]

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 2000 AND 2500 POUNDS.

Make	Model	Capacity	Chassis Price	S. A. E. Rating	Engine Cyls.	How Cnst.	Bore. Stroke.	Valve Location	No. Main Bear.	Max. RPM.	Lubrication	Cooling System	Radiator Type	Ignition, Make	Type, Control	Governor Drive	Speed, MPH.	Clutch Type	Trans. Gearset	Located	Driven by	Ratio Gear Red.	Tor. Taken by	Propelled by	Springs, For.	Springs, Rear.	Wheelbase	Tire Type	Tire Sizes	Driver's Seat	Control Levers
Wichita	A	2000	\$1800	19.60	Four	Block	3 1/2 x 5	Left	Two	1080	Spl. pres.	Thermo	Cell. sheet	Stromberg	Bosch, Else.	Single, hand	18	Cone	Selective	Unit-J, 3	Double chain	7.32-1	Frame	Radius rod	1/2 elliptic	110 in.	Solid	34x3, 34x4	Right	Centre	
Wichita	K	2000	\$1890	19.61	Four	Block	3 1/2 x 5	Left	Two	1085	Spl. pres.	Thermo	Cell. cast	Stromberg	Bosch	Single, hand	18	Cone	Selective	Unit-M, 2	Top worm	7.80-1	Springs	Radius rod	1/2 elliptic	118 in.	Solid	36x3, 36x4	Right	Centre	
Witcomb	S	2000	\$2000	22.50	Four	Block	3 1/2 x 5	Left	Three	1500	Cir. spl.	Thermo	Cellular	Optional	Bosch	Single, hand	18	Dry disc	Selective	Unit-M, 3	Top worm	6.50-1	Springs	Radius rod	1/2 elliptic	128 in.	Pneumatic	35x5, 35x5	Left	Centre	
Witt-Will	WD-16	2000	\$2000	22.50	Four	Block	3 1/2 x 5 1/2	Left	Three	1500	Cir. spl.	Thermo	Cellular	Optional	Bosch	Single, hand	18	Dry disc	Selective	Unit-M, 3	Top worm	6.50-1	Springs	Radius rod	1/2 elliptic	128 in.	Pneumatic	35x5, 35x5	Left	Centre	
Bethlehem	A 1	2500	\$1245	22.50	Four	Block	3 1/2 x 4 1/2	Left	Three	1300	Spl. pres.	Thermo	Honeycomb	Schebler	Single, hand	18	Wet disc	Selective	Unit-M, 3	Int. gear	7.40-1	Springs	Radius rod	1/2 elliptic	126 in.	Solid	34x3, 34x4	Left	Centre		
Gierst	C	2000	\$2000	22.50	Four	Block	3 1/2 x 5 1/2	Left	Three	1050	Spl. pres.	Thermo	Rayfield	Westinghouse	Single, hand	13	Dry plate	Ind. clutch	Unit-M, 3	Worm	8.60-1	Springs	Radius rod	1/2 elliptic	150 in.	Solid	36x4, 36x7	Left	Centre		
Kiesel	K	2500	\$1185	19.61	Four	Block	3 1/2 x 5 1/2	Left	Three	1100	Spl. pres.	Thermo	Cell. cast	Stromberg	Elsemann	Single, fixed	25	Dry plate	Selective	Unit-M, 3	Worm	6.50-1	Springs	Radius rod	1/2 elliptic	129 in.	Solid	34x3, 34x4	Left	Centre	
Koehler	K	2500	\$1150	19.60	Four	Block	3 1/2 x 5	Head	Three	2500	Spl. pres.	Thermo	V. tube	Stromberg	Elsemann	Single fixed	25	Dry plate	Selective	Unit-M, 3	Int. gear	7.00-1	Springs	Radius rod	1/2 elliptic	129 in.	Solid	34x3, 34x4	Left	Centre	
Packard	1 E	2500	\$2450	25.60	Four	Block	4x5 1/2	Right	Four	1000	Pressure	Cent. pump	Cell. sheet	Packard	Dixie, Split.	Single, hand	16	Dry disc	Selective	Unit-M, 3	Top worm	6.25-1	Torsion arm	Radius rod	1/2 elliptic	126, 144 in.	Solid	34x3 1/2, 34x6	Left	Centre	
Rainier	R 4	2500	\$1150	16.92	Four	Block	3 1/2 x 4 1/2	Left	Two	1800	Spl. pres.	Thermo	Cellular	Zenith	Single, hand	20	Mul. disc	Selective	Unit-M, 3	Worm	8.50-1	Springs	Radius rod	1/2 elliptic	125 in.	Pneum. solid	33x4, 34x4	Left	Centre		

LOAD CAPACITY, 2500 AND 3000 POUNDS.

Atterbury	Barker	Beck	Brockway	Chase	Clydesdale	Continental	Corbitt	D-E	Defiance	Diamond T
7 R	U	B	J 2	C	45	HL	D	B	A	J 4
Model	Model	Model	Model	Model	Model	Model	Model	Model	Model	Model
Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity
Chassis Price	Chassis Price	Chassis Price	Chassis Price	Chassis Price	Chassis Price	Chassis Price	Chassis Price	Chassis Price	Chassis Price	Chassis Price
S. A. E. Rating	S. A. E. Rating	S. A. E. Rating	S. A. E. Rating	S. A. E. Rating	S. A. E. Rating	S. A. E. Rating	S. A. E. Rating	S. A. E. Rating	S. A. E. Rating	S. A. E. Rating
Engine Cyls.	Engine Cyls.	Engine Cyls.	Engine Cyls.	Engine Cyls.	Engine Cyls.	Engine Cyls.	Engine Cyls.	Engine Cyls.	Engine Cyls.	Engine Cyls.
How Cnst.	How Cnst.	How Cnst.	How Cnst.	How Cnst.	How Cnst.	How Cnst.	How Cnst.	How Cnst.	How Cnst.	How Cnst.
Valve Location	Valve Location	Valve Location	Valve Location	Valve Location	Valve Location	Valve Location	Valve Location	Valve Location	Valve Location	Valve Location
No. Main Bear.	No. Main Bear.	No. Main Bear.	No. Main Bear.	No. Main Bear.	No. Main Bear.	No. Main Bear.	No. Main Bear.	No. Main Bear.	No. Main Bear.	No. Main Bear.
Max. RPM.	Max. RPM.	Max. RPM.	Max. RPM.	Max. RPM.	Max. RPM.	Max. RPM.	Max. RPM.	Max. RPM.	Max. RPM.	Max. RPM.
Lubrication	Lubrication	Lubrication	Lubrication	Lubrication	Lubrication	Lubrication	Lubrication	Lubrication	Lubrication	Lubrication
Cooling System	Cooling System	Cooling System	Cooling System	Cooling System	Cooling System	Cooling System	Cooling System	Cooling System	Cooling System	Cooling System
Radiator Type	Radiator Type	Radiator Type	Radiator Type	Radiator Type	Radiator Type	Radiator Type	Radiator Type	Radiator Type	Radiator Type	Radiator Type
Carburetor	Carburetor	Carburetor	Carburetor	Carburetor	Carburetor	Carburetor	Carburetor	Carburetor	Carburetor	Carburetor
Ignition	Ignition	Ignition	Ignition	Ignition	Ignition	Ignition	Ignition	Ignition	Ignition	Ignition
Type, Control	Type, Control	Type, Control	Type, Control	Type, Control	Type, Control	Type, Control	Type, Control	Type, Control	Type, Control	Type, Control
Governor Drive	Governor Drive	Governor Drive	Governor Drive	Governor Drive	Governor Drive	Governor Drive	Governor Drive	Governor Drive	Governor Drive	Governor Drive
Speed, MPH.	Speed, MPH.	Speed, MPH.	Speed, MPH.	Speed, MPH.	Speed, MPH.	Speed, MPH.	Speed, MPH.	Speed, MPH.	Speed, MPH.	Speed, MPH.
Clutch Type	Clutch Type	Clutch Type	Clutch Type	Clutch Type	Clutch Type	Clutch Type	Clutch Type	Clutch Type	Clutch Type	Clutch Type
Transmission	Transmission	Transmission	Transmission	Transmission	Transmission	Transmission	Transmission	Transmission	Transmission	Transmission
Located	Located	Located	Located	Located	Located	Located	Located	Located	Located	Located
Driven by	Driven by	Driven by	Driven by	Driven by	Driven by	Driven by	Driven by	Driven by	Driven by	Driven by
Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.	Ratio Gear Red.
Tor. Taken by	Tor. Taken by	Tor. Taken by	Tor. Taken by	Tor. Taken by	Tor. Taken by	Tor. Taken by	Tor. Taken by	Tor. Taken by	Tor. Taken by	Tor. Taken by
Propelled by	Propelled by	Propelled by	Propelled by	Propelled by	Propelled by	Propelled by	Propelled by	Propelled by	Propelled by	Propelled by
Springs, For.	Springs, For.	Springs, For.	Springs, For.	Springs, For.	Springs, For.	Springs, For.	Springs, For.	Springs, For.	Springs, For.	Springs, For.
Springs, Rear.	Springs, Rear.	Springs, Rear.	Springs, Rear.	Springs, Rear.	Springs, Rear.	Springs, Rear.	Springs, Rear.	Springs, Rear.	Springs, Rear.	Springs, Rear.
Wheelbase	Wheelbase	Wheelbase	Wheelbase	Wheelbase	Wheelbase	Wheelbase	Wheelbase	Wheelbase	Wheelbase	Wheelbase
Tire Type	Tire Type	Tire Type	Tire Type	Tire Type	Tire Type	Tire Type	Tire Type	Tire Type	Tire Type	Tire Type
Tire Sizes	Tire Sizes	Tire Sizes	Tire Sizes	Tire Sizes	Tire Sizes	Tire Sizes	Tire Sizes	Tire Sizes	Tire Sizes	Tire Sizes
Driver's Seat	Driver's Seat	Driver's Seat	Driver's Seat	Driver's Seat	Driver's Seat	Driver's Seat	Driver's Seat	Driver's Seat	Driver's Seat	Driver's Seat
Control Levers	Control Levers	Control Levers	Control Levers	Control Levers	Control Levers	Control Levers	Control Levers	Control Levers	Control Levers	Control Levers

LOAD CAPACITY, 3000 POUNDS.

Make	Federal	Fulton	Garford	Gary	G. M. C.	Globe	Gramm-Bern.	Grant	Hahn	Hawkeye	Horner	Harlbert
Model	..... T	FX	66 B	G	31	B	.....	10-11	.....	J	.....	I
Capacity	..... 3000	3000	3000	3000	2000	3000	3000	2000	3000	3000	.....	3000
Chassis	..... \$2350	\$1420	\$2500	.....	.....	\$1750	\$2300	\$1490, \$1585	3000	3000	.....	\$2600
S. A. E. Rating	..... 22.50	19.61	22.50	28.90	.....	Four	Four	Four	Four	Four	.....	22.50
Engine Cyls.	..... Four	Block	Block	Block	Block	Four	Four	Four	Four	Four	.....	Four
How Cast	..... Block	3 1/2 x 5 1/2	3 1/2 x 5 1/2	4 1/2 x 5 1/2	3 1/2 x 5 1/2	Block	Block	3 1/2 x 5 1/2	4 1/2 x 5 1/2	Block	.....	Block
Bore, Stroke	..... 3 1/2 x 5 1/2	Right	Right	Right	Right	3 1/2 x 5 1/2	3 1/2 x 5 1/2	3 1/2 x 5 1/2	4 1/2 x 5 1/2	3 1/2 x 5 1/2	.....	3 1/2 x 5 1/2
Valve Location	..... Right	T head	Three	Three	Three	Right	Left	Three	.....	Right	.....	Right
No. Main Bear.	..... Five	2400	1000	1275	1300	Three	Three	Three	.....	Three	.....	Three
Max. RPM	..... 1190	.....	.....	.....	.....	1200	1200	.....	980	1400	.....	1375
Lubrication	..... Pressure	Spl. pres.	Clr. spl.	Pressure	Clr. spl.	Spl. pres.	.....	Spl. pres.	Spl. pres.	Spl. pres.	.....	Spl. pres.
Cooling System	..... Cent. pump	Thermo syb.	Centrifugal	Cent. pump	Centrifugal	Cent. pump	.....	Thermo	.....	Thermo	.....	Cent. pump
Radiator Type	..... Fin. sheet	Cell. sheet	Fin. T. cast	Honeycomb	Fin. T. cast	Prefix	.....	Cell. sheet	.....	Cell. cast	.....	Cell. sheet
Carburetor	..... Zenith	Carter	Rayfield	Stromberg	Marvel	Master	.....	Stewart	.....	Master	.....	Shakespeare
Ignition, Make	..... Elsemann	Splitdorf	Dixie	Elsemann	Elsemann	Elsemann	.....	Dixie	.....	Elsemann	.....	Dixie
Type, Control	..... Single, fixed	Single, hand	Single, hand	Fixed	Single, hand	Single, left	.....	Single, hand	.....	Single, hand	.....	Single, hand
Governor Drive	..... Motor	.....	Motor	Pierce	Motor	Engine	.....	Shaft	.....	Motor	.....	Motor
Speed, MPH	..... 15	18.20	16	15	15	18	17	14	15	15	.....	18
Clutch Type	..... Dry plate	Dry disc	Dry disc	Dry disc	Dry disc	Dry plate	.....	Dry disc	.....	Dry plate	.....	Dry disc
Trans. Gearset	..... Selective	Selective	Selective	Selective	Selective	Selective	.....	Selective	.....	Selective	.....	Selective
Located Speeds	..... Amid., 4	Amid., 3	Amid., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	.....	Unit-M., 3	.....	Unit-M., 3	.....	Unit-M., 3
Driven by	..... Worm	Int. gear	Top worm	Top worm	Top worm	Int. gear	.....	Int. gear	.....	Int. gear	.....	Worm
Ratio Gear Red.	..... 5.50-1	8.20-1	8.50-1	7.75-1	9.25-1	8.00-1	.....	7.75-1	.....	7.00-1	.....	6.25-1
Tor. Taken by	..... Springs	Springs	Springs	Springs	Springs	Springs	.....	Springs	.....	Springs	.....	Springs
Propelled by	..... Radius rod	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic	.....	1/2 elliptic	.....	1/2 elliptic
Springs, For	..... 1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic	.....	1/2 elliptic	.....	1/2 elliptic
Springs, Rear	..... 1/2 elliptic	142 in.	142 in.	144 in.	130, 144 in.	144 in.	.....	124, 140 in.	.....	136 1/2 in.	.....	136 in.
Wheelbase	..... 144 in.	Solid	Solid	Solid	Solid	Solid	.....	Pneuc. solid	.....	Solid	.....	Solid
Tire Type	..... Solid	34x3 1/2, 34x5	36x3 1/2, 36x5	36x3 1/2, 36x5	36x3 1/2, 36x5	36x3 1/2, 36x5	.....	34x4 1/2, 34x4	.....	36x3 1/2, 36x3 3/4, 34x5	.....	36x4, 34x5
Tire Size	..... 36x3 1/2, 36x5	Left	Left	Left	Left	Left	.....	Left	.....	Right	.....	Left
Driver's Seat	..... Left	Centre	Centre	Centre	Centre	Centre	.....	Centre	.....	Centre	.....	Centre
Control Levers	..... Centre	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

LOAD CAPACITY, 3000 POUNDS.

Make	Kelly Spring.	Kelly Spring.	Kielber	Lamson	Laue	Lange	Larrabee	Lip. Stewart	Maceur	Mack	Mainly
Model	..... K 31	K 32	A	.....	F	C	N	F	L	AB	AB
Capacity	..... 3000	3000	3000	3000	3000	3000	2000	3000	3000	3000	3000
Chassis	..... \$2500	\$2500	\$2500	\$1850	\$1850	\$1950	\$2200	\$2750	\$2400	\$2800	\$2000
S. A. E. Rating	..... 22.50	22.50	27.20	25.60	22.50	27.20	27.20	27.50	27.20	25.60	22.50
Engine Cyls.	..... Four	Four	Four	Four	Four	Four	Block	Block	Block	Four	Four
How Cast	..... Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	..... 3 1/2 x 5 1/2	3 1/2 x 5 1/2	4 1/2 x 5 1/2	4x5	3 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4x5	3 1/2 x 5 1/2
Valve Location	..... Left	Left	Left	.....	Right	.....	Left	Left	Left	Right	Right
No. Main Bear.	..... Three	Three	Three	.....	Three	.....	Three	Three	Three	Three	Three
Max. RPM	..... 1250	1250	1250	1200	.....	1250	1200	1080	1000	1275	1125
Lubrication	..... Pressure	Pressure	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	.....	Spl. pres.	Spl. pres.	Spl. pres.	.....
Cooling System	..... Centrifugal	Centrifugal	Cent. pump	Cent. pump	Thermo	Thermo	.....	Water pump	Centrifugal	Cent. pump	.....
Radiator Type	..... Cell. cast	Cellular	Cellular	.....	Fin. T. cast	Thermo	.....	Cell. cast	Fin. cast	Cell. sheet	.....
Carburetor	..... Rayfield	Rayfield	Schebler	Stromberg	Stromberg	Stromberg	.....	Zenith	Stromberg	Stromberg	.....
Ignition, Make	..... Elsemann	Elsemann	Bosch	Bosch	Battery	Bosch	.....	Elsemann	Bosch	Splitdorf	.....
Type, Control	..... Single, fixed	Single, fixed	Single, hand	Single, manual	Single, hand	Single, hand	.....	Fixed	Single, hand	Single, hand	.....
Governor Drive	..... Motor	Motor	Motor	.....	Engine	Motor	.....	Motor	Helical gear	Motor	.....
Speed, MPH	..... 16	16	18	16	15	15	15	18	17	17 1/2	16
Clutch Type	..... Cone	Wet disc	Wet disc	Dry plate	Dry disc	Wet disc	.....	Cone	Dry disc	Dry disc	.....
Trans. Gearset	..... Selective	Selective	Selective	Ind. clutch	Selective	Selective	.....	Selective	Selective	Selective	.....
Located Speeds	..... Unit-J, 3	Unit-M., 4	Amid., 4	Unit-M., 3	Unit-M., 3	Amid., 3	.....	Unit-M., 3	Unit-M., 3	Unit-M., 4	.....
Driven by	..... Worm	Top worm	Top worm	Top worm	Top worm	Chain	.....	Top worm	Top worm	Double chain	.....
Ratio Gear Red.	..... 8.60-1	8.50-1	7.75-1	10.70-1	7.75-1	9.20-1	.....	7.75-1	7.00-1	6.99-1	.....
Tor. Taken by	..... Springs	Springs	Springs	Springs	Springs	Radius rod	.....	Springs	Springs	Torque tube	.....
Propelled by	..... Radius rod	Radius rod	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	Radius rod	Radius rod	Radius rod	.....
Springs, For	..... 1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....
Springs, Rear	..... 1/2 elliptic	140 in.	140 in.	150 in.	136 in.	140 in.	.....	145, 158 in.	150 in.	162 in.	.....
Wheelbase	..... 144 in.	Solid	Solid	Solid	Solid	Solid	.....	Solid	Solid	Solid	.....
Tire Type	..... Solid	36x3 1/2, 36x6	36x3 1/2, 36x6	36x3 1/2, 36x5	34x2 1/2, 34x5	36x4, 38x6	.....	36x3 1/2, 36x3d	36x4, 36x5	36x4, 36x3 1/2d	.....
Tire Size	..... 36x3 1/2, 36x6	Left	Right	Left	Left	Left	.....	Left	Left	Left	.....
Driver's Seat	..... Left	Centre	Centre	centre	Left	Left	.....	Left	Left	Left	.....
Control Levers	..... Centre	.....	.....	.....	Centre	Centre	.....	Centre	Centre	Centre	.....

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 3000 POUNDS.

Make	Model	Menominee	Moreland	New York	Old Reliable	Ouellet	Packard	Panhard	Republic	Royal	Sandow	Sanford	Service
Capacity	3000	3000	3000	3000	3000	3000	3000, 3500	2000	11 X	B 1½	3000	3000	230
Chassis Price	\$2190	\$2200	\$2150	\$2150	\$2250	\$2250	\$2800	\$1950	3000	\$2100	\$2075	\$2200	3000
S. A. E. Rating	22.50	22.50	22.50	22.50	27.23	27.23	25.60	19.61	22.50	22.50	19.50	22.50	\$2550
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Pairs	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Four
Bore, Stroke	3½x5½	4½x5½	3½x5½	3½x5½	3½x5½	3½x5½	4½x5½	3½x5½	3½x5½	3½x5½	3½x5½	3½x5½	4½x5½
Valve Location	Right	Left	Left	Left	Left	Left	Right	Left	Left	Left	Right	Right	Right
No. Main Bear.	Three	Three	Three	Three	Three	Three	Four	Three	Three	Three	Three	Three	Three
Max. RPM	1400	1400	1400	1400	1040	1040	1000	1600	.....	1600	1000	.....	1800
Lubrication	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Pressure	Pressure	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Pressure
Cooling System	Water pump	Cent. pump	Cent. pump	Cent. pump	Centrifugal	Centrifugal	Centrifugal	Thermo	Thermo	Thermo	Thermo	Thermo	Centrifugal
Radiator Type	Water pump	Cell. cast	Cell. cast	Cell. cast	Cellular	Cellular	Cellular	Plain tube	Cell. cast	Cellular	Cellular	Cell. cast	Fin. T. cast
Carburetor	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Packard	Schebler	Stromberg	Stromberg	Stromberg	Stromberg	Master
Ignition, Make	Elsemann	Bosch	Bosch	Bosch	Bosch	Bosch	Dixie, Split.	Auto-Lite	Bosch	Bosch	Elsemann	Bosch	Elsemann
Type, Control	Single, hand	Single, hand	Single, hand	Single, hand	Single	Single	Single, hand	Hand	Single, fixed	Single, fixed	Single, auto	Single, hand	Single, hand
Governor Drive	Gear set	Motor	Motor	Motor	Motor	Motor	Motor	.....	.....	.....	.....	.....	Engine drive
Speed, MPH	15	18	18	18	15	15	16	.....	15	18	18	17½	15
Clutch Type	Dry disc	Dry disc	Dry disc	Dry disc	Wet disc	Wet disc	Dry disc	.....	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc
Trans. Gearset	Selective	Selective	Selective	Selective	Ind. clutch	Ind. clutch	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Unit-M., 3	Unit-M., 2	Unit-M., 3	Unit-M., 2	Unit-M., 3	Unit-M., 3	Unit-M., 4	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3
Driven by	Top worm	Top worm	Top worm	Top worm	Worm	Worm	Top worm	Int. gear	Int. gear	Int. gear	Top worm	Top worm	Top worm
Ratio Gear Red.	9.25-1	7.75-1	7.75-1	7.75-1	9.20-1	9.20-1	6.25-1	6.50-1	8.00-1	8.00-1	8.75-1	8.75-1	7.75-1
Tor. Taken by	Springs	Springs	Springs	Springs	Springs	Springs	Torsion arm	Springs	Springs	Springs	Springs	Springs	Springs
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Springs	Springs	Springs	Springs	Springs	Springs
Springs, For	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic
Springs, Rear	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic
Wheelbase	130, 144 in.	144 in.	144 in.	144 in.	130 in.	130 in.	126, 144 in.	130 in.	144 in.	144 in.	138 in.	140 in.	150 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Pneum. solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x3½, 36x5	36x3½, 36x5	36x3½, 36x5	36x3½, 36x5	36x3½, 36x5	36x3½, 36x5	34x3½, 34x5	32x3½, 32x5	34x3½, 34x5	34x4, 34x5	34x4, 34x5	36x3½, 36x5	36x3½, 36x5
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Left	Left	Right	Left	Left	Left
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Left, centre	Left	Centre	Right	Centre	Centre	Centre

LOAD CAPACITY, 3000 POUNDS.

Make	Model	Signal	Stewart	Sullivan	Taylor	Timin	Triangle	Universal	Velle	White	White-Hickory	Wichita	Wilcox
Capacity	3000	3000	3000	3000	3000	3000	3000	3000	25 A	THC	H	L	X
Chassis Price	\$2375	\$1695	\$2150	\$2200	\$1970	\$1970	.....	\$1950	\$2750	\$3300	\$2200	\$2100	.....
S. A. E. Rating	27.50	22.50	22.50	22.50	22.50	22.50	.....	22.50	27.20	22.50	22.50	19.61	29.00
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Block	Block	Block	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Four	Pairs
Bore, Stroke	4½x5½	3½x5	3½x4½	3½x5	3½x5½	3½x5½	3½x5½	3½x5½	4½x5½	4½x5½	4½x5½	3½x5	4½x5
Valve Location	Left	Right	Right	Right	Left	Left	.....	Right	Left	Right	Head	Left	Right
No. Main Bear.	Three	Two	Two	Two	Three	Three	.....	Three	Three	Two	Three	Two	Three
Max. RPM	1295	1700	1700	1100	1000	1000	1200	1160	1000	.....	1100	1200	1200
Lubrication	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Pressure	Spl. pres.	Pressure	Spl. pres.	Spl. pres.	Clr. spl.
Cooling System	Centrifugal	Thermo	Thermo	Cent. pump	Cent. pump	Cent. pump	Centrifugal	Pump	Centrifugal	Cent. pump	Centrifugal	Thermo	Centrifugal
Radiator Type	Fin. cast	Fin. T. sheet	Fin. T. sheet	Fin. cast	Fin. cast	Fin. cast	Tube sheet	Fin. cast	Fin. cast	Cellular	Cellular	Cell. cast	Cell. sheet
Carburetor	Stromberg	Holley	Holley	Zenith	Schebler	Schebler	Stromberg	Zenith	Stromberg	White	Stromberg	Stromberg	Optional
Ignition, Make	Elsemann	Bosch	Bosch	Zenith	Elsemann	Elsemann	Elsemann	Elsemann	Bosch	.....	Elsemann	Bosch	Bosch
Type, Control	Single, fixed	Single, fixed	Single, fixed	Single	Single, hand	Single, hand	Single	Single, hand	Single, hand	H. T. M., hand	Single, hand	Single, hand	Single, hand
Governor Drive	Motor	.....	.....	.....	Gear set	Motor	Motor	.....	Motor	.....	Motor	.....	Motor
Speed, MPH	15	20	17	18	12	12	15	15	18	.....	15	15	16
Clutch Type	Dry disc	Dry plate	Cone	Dry plate	Dry disc	Dry disc	Dry disc	Dry plate	Dry disc	Wet plate	Dry disc	Cone	Cone
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Unit-M., 3	Unit-M., 2	Unit-M., 3	Unit-M., 4	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 4	Unit-M., 4	Unit-M., 3	Unit-M., 3	Unit-M., 3
Driven by	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm
Ratio Gear Red.	9.25-1	7.00-1	8.50-1	7.80-1	8.60-1	8.60-1	8.00-1	7.83-1	8.80-1	Double red.	7.75-1	8.66, 10.66-1	7.70-1
Tor. Taken by	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Torsion arm	Springs	Springs	Springs	Springs	Springs
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Springs	Springs	Springs
Springs, For	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic
Springs, Rear	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic	½ elliptic
Wheelbase	144 in.	140 in.	129 in.	142 in.	135 in.	135 in.	144 in.	132 in.	150 in.	157½ in.	144 in.	118 in.	135, 144 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Pneum. solid	Solid	Solid	Solid
Tire Sizes	34x4, 36x6	34x3½, 34x5	36x3½, 36x5	24x4, 34x6	36x3½, 36x5	36x3½, 36x5	34x3½, 34x5	34x3½, 34x5	36x4, 36x7	36x4½, 36x5	36x3½, 36x5	36x3½, 36x5	36x4, 36x5
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left
Control Levers	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 4000 POUNDS.

Make	Fargo	Federal	Forchler	Gabriel	Garford	Gary	G. M. C.	Gramm-Hiera.	Grant	Hall
Model	P	F	R	E	70 B	H	41	15-16		
Capacity	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Chassis Price	\$2200	\$2600	\$2500	\$2750	\$3000	.....	.....	\$2600	\$1790, \$1885	\$2350
S. A. E. Rating	25.90	27.50	27.20	30.00	29.00	28.90	27.22	22.50	22.50	27.20
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	3 1/2 x 5 1/2	3 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	3 3/4 x 5 1/2	3 3/4 x 5	4 1/2 x 5 1/2
Valve Location	Right	Right	Left	Left	Right	Right	Right	Left	Left	Left
No. Main Bear.	Three	Five	Three	Three	Three	Three	Three	Three	Five	Five
Max. RPM	1250	1125	1200	1200	1200	1275	1200	1200	1200	1200
Lubrication	Spl. pres.	Pressure	Spl. pres.	Pressure	Clr. spl.	Pressure	Spl. pres.	Pressure	Thermo	Pressure
Cooling System	Thermo	Cent. pump	Centrifugal	Centrifugal	Centrifugal	Cent. pump	Centrifugal	Pump	Thermo	Cent. pump
Radiator Type	Fin. cast	Fin. sheet	Sq. T. sheet	Cell. sheet	Tubular	Honeycomb	Fin. T. cast	Fin. T. cast	Cell. sheet	Fin. cast
Carburetor	Zenith	Zenith	Zenith	Rayfield	Rayfield	Stromberg	Marvel	Zenith	Stewart	Zenith
Ignition, Make	Else., Sp., Dix.	Elsemann	Bosch	Bosch	Dixie	Elsemann	Elsemann	Elsemann	Dixie	Bosch
Type, Control	Single, fixed	Single, fixed	Single, fixed	Single, hand	Single, hand	Fixed	Single, hand	Single, hand	Single, hand	Single, hand
Governor Drive	Motor	Motor	Motor	Motor	Motor	.....	Motor	Engine	Shaft	Motor
Speed, MPH	15	13	14	16 1/2	14	15	14	16	14	18
Trans. Gearset	Dry plate	Dry plate	Wet disc	Dry plate	Dry disc	Wet disc	Dry disc	Dry disc	Dry disc	Wet disc
Located by	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Driven by	Unit-M, 3	Unit-M, 4	Unit-M, 3	Amid., 4	Amid., 3	Unit-M, 3	Unit-M, 4	Amid., 3	Unit-M, 3	Unit-M, 3
Ratio Gear Red.	7.75-1	7.25-1	7.25-1	7.75-1	8.50-1	8.75-1	9.25-1	8.60-1	9.00-1	.....
Tor. Taken by	Springs	Springs	Springs	Radius rod	Springs	Springs	Springs	Springs	Springs	Springs
Propelled by	1/2 elliptic	Radius rod	Springs	Radius rod	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, For	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	156 in.	140 in.	144, 168 in.	144, 168 in.	156 in.	144, 158 in.	144, 158 in.	124, 140 in.	144 in.
Wheelbase	144, 172 in.	146 in.	140 in.	144, 168 in.	144, 168 in.	156 in.	144, 158 in.	144, 158 in.	124, 140 in.	144 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	34x4, 36x7	34x4, 36x6	34x4, 34x6	35x6, 36x4d	35x4, 36x4d	35x4, 36x6	35x4, 36x4d	34x4, 34x3 1/2 d	34x4, 34x5	36x4, 36x4d
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

LOAD CAPACITY, 4000 POUNDS.

Make	Hercules	Horner	Hurlburt	Independent	Indiana	Kiesel	Kielber	Lip. Stewart	Little Giant	Mack
Model	G	FG	2	G	D	.....	R H	G	16	AB
Capacity	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Chassis Price	\$2800	\$2750	\$2500	\$1850	\$2500	\$2575	\$2750	\$3050	.....	\$3000
S. A. E. Rating	29.40	15.60	28.90	27.20	27.20	28.90	27.23	27.50	27.23	25.60
Engine Cyls.	Six	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	3 1/2 x 5 1/2	3 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	.....	Left	Right	Right	Right	Right	Left	Left	Left	Right
No. Main Bear.	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three
Max. RPM	1625	1200	1300	1200	1800	1190	1250	1225	1100	1275
Lubrication	Spl. pres.	Spl. pres.	Spl. pres.	Pressure	Spl. pres.	Spl. pres.	Spl. pres.	Water pump	Spl. pres.	Spl. pres.
Cooling System	Cent. pump	Cent. pump	Cent. pump	Thermo	Centrifugal	Cent. pump	Cent. pump	Water pump	Cent. pump	Cent. pump
Radiator Type	Cell. cast	Fin. P. steel	Fin. T. cast	Cell. cast	Fin. T. cast	Cell. sheet	Cellular	Cell. cast	Cellular	Cell. sheet
Carburetor	Rayfield	Master	Shakespeare	Marvel	Stromberg	Stromberg	Schebler	Zenith	Schebler	Stromberg
Ignition, Make	Berling	Bosch	Dixie	Elsemann	Bosch	Elsemann	Bosch	Elsemann	Elsemann	Spiltdorf
Type, Control	Single, fixed	Dual	Dual	Single, fixed	Single, hand	Single, hand	Single, manual	Fixed	Single, auto	Single, hand
Governor Drive	Motor	Engine	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor
Speed, MPH	18	13 1/2	16	15	16	15	16	15	15	17 1/2
Trans. Gearset	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Wet disc	Wet disc	Cone	Dry disc	Dry disc
Located by	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Driven by	Unit-M, 3	Unit-M, 3	Unit-M, 3	Unit-M, 3	Unit-M, 3	Amid., three	Amid., three	Amid., 3	Unit-M, 3	Unit-M, 4
Tor. Taken by	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm
Ratio Gear Red.	9.67-1	9.43-1	8.66-1	8.66-1	7.75-1	8.50-1	7.75-1	9.25-1	7.75-1	8.50-1
Propelled by	Springs rod	Radius rod	Radius rod	Springs	Springs	Springs	Springs	Springs	Springs	Torque tube
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	150 in.	145 in.	148 in.	144 in.	150 in.	168 in.	140 in.	158, 165 in.	144 in.	162 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	34x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x3 1/2, 36x5	36x4, 36x7	34x4, 34x7	36x4, 36x3 1/2 d	36x4, 36x7	36x4, 36x3 1/2 d	36x4, 36x4d
Driver's Seat	Left	Left	Left	Left	Left	Left	Right	Left	Right	Left

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 4000 POUNDS.

Make	Model	Max. Capacity	Chassis Price	S. A. E. Rating	Engine Cyls.	How Cast	Bore, Stroke	Valve Location	No. Main Bearings	Max. RPM	Lubrication	Cooling System	Radiator Type	Carburetor	Ignition, Make	Tyres, Control	Governor Drive	Speed, MPH	Clutch Type	Trans. Gearset	Lorated Speeds	Driven by	Ratio Gear Red.	Tor. Taken by	Propelled by	Springs, For	Springs, Rear	Wheelbase	Tire Size	Driver's Seat	Control Levers	
Master	M	4000	\$1990	28.90	Four	Block	4 1/4 x 5 1/2	Right	Three	1200	Pressure	Cent. pump	Honeycomb	Master	Eisemann	Single, fixed	Master	18	Dry disc	Selective	Unit-M. 3	Int. gear	8.00-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	34x4, 36x6	Left	Centre
Menominee	D	4000	\$2615	27.23	Four	Pairs	4 1/4 x 5 1/2	Right	Three	1200	Spl. pres.	Water pump	Tubular	Stromberg	Eisemann	Single, hand	Gear set	14	Dry disc	Selective	Unit-M. 3	Int. gear	9.25-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	36x4, 36x4d	Left	Centre
Munksgon	20	4000	\$1995	27.23	Four	Block	4 1/4 x 5 1/2	Left	Three	1230	Spl. pres.	Centrifugal	Cell. cast	Stewart	Eisemann	Single	Motor	16	Dry disc	Selective	Unit-M. 3	Int. gear	8.00-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	36x4, 36x6	Left	Centre
Nash	3017	4000	\$1875	22.50	Four	Block	3 3/4 x 5 1/2	Right	Three	1290	Spl. pres.	Cent. pump	Fin. tube	Stromberg	Delco	Single, hand	Motor	16	Dry disc	Selective	Unit-M. 3	Int. gear	8.10-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	34x4, 34x6	Left	Centre
Nash	4017	4000	\$2250	28.90	Four	Block	4 1/4 x 5 1/2	Right	Three	1191	Force feed	Cent. pump	Fin. tube	Stromberg	Eisemann	Single, hand	Motor	15	Dry disc	Selective	Unit-M. 3	Int. gear	8.50-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	36x5, 36x5	Left	Centre
Nel. & Le Moon	E 2	4000	\$2250	27.20	Four	Block	4 1/4 x 5 1/2	Left	Three	1000	Clr. spl.	Centrifugal	Sq. T. sheet	Eisemann	Dual	Motor	14	Dry disc	Selective	Unit-M. 3	Top worm	8.75-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	36x4, 36x7	Right	Centre	
Nel. & Le Moon	D	4000	\$2800	27.20	Four	Block	4 1/4 x 5 1/2	Left	Three	1200	Clr. spl.	Centrifugal	Fin. cast	Eisemann	Single, fixed	Drive shaft	Motor	15	Dry plate	Selective	Unit-M. 3	Top worm	7.50-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	36x4, 36x4d	Left	Centre
New York	N	4000	\$2600	27.20	Four	Block	4 1/4 x 5 1/2	Right	Three	1100	Spl. pres.	Cent. pump	Cell. cast	Stromberg	Rosch	Single, hand	Motor	15	Dry plate	Selective	Unit-M. 3	Top worm	8.50-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	36x4, 36x4d	Left	Centre
Niles	E	4000	\$2400	27.20	Four	Block	4 1/4 x 5 1/2	Right	Three	1173	Spl. pres.	Cent. pump	Cell. sheet	Stromberg	Eisemann	Single, hand	Motor	15	Dry plate	Selective	Unit-M. 3	Top worm	8.50-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	140 in.	Solid	36x4, 36x7	Left	Centre
Noble	NW 2	4000-5000	\$2720	27.20	Four	Block	4 1/4 x 5 1/2	Left	Three	1300	Sol. pres.	Water pump	Fin. T. cast	Stromberg	Eisemann	Single, hand	Shaft	16	Dry plate	Selective	Unit-M. 3	Top worm	8.75-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	148 in.	Solid	36x4, 36x6	Left	Centre
Onida	C	4000	\$3000	27.23	Four	Block	4 1/4 x 5 1/2	Left	Three	970	Spl. pres.	Centrifugal	Fin. cast	Stromberg	Rosch	Single, hand	Motor	14	Wet disc	Selective	Unit-M. 3	Top worm	9.20-1	Springs	Radius rod	1/2 elliptic	1/2 elliptic	144 in.	Solid	36x4, 26x4d	Left	Centre

LOAD CAPACITY, 4000 POUNDS.

Make	Packard	Palmer	Pierce-Arrow	Reo	Republle	Rowe	Royal	Sandow	G. A. Schacht	Selden	Servire
Model	2 E	.....	X 4	J	A	CDW	H 2	D	J C	J W L	240
Capacity	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Chassis Price	4000-5000	\$2595	\$3750	\$1800	\$1975	\$2800	\$2500	\$2650	\$2350	\$2750	\$2750
S. A. E. Rating	35.60	27.20	25.60	27.20	27.20	25.60	25.60	27.23	22.50	27.23	28.90
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Pairs	Pairs	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	4x5 1/2	4 1/4 x 5 1/2	4x5 1/2	4 1/4 x 5 1/2	4 1/4 x 5 1/2	4x5	4x6	4 1/4 x 5 1/4	4 1/4 x 5 1/2	4 1/4 x 5 1/4	4 1/4 x 5 1/4
Valve Location	Right	Left	T head	R. & H.	Right	Left	Left	.....	Left	Left	Right
No. Main Bear.	Four	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three
Max. RPM	1000	.....	1050	1250	1100	1100	1600	1000	1295	1295	1800
Lubrication	Pressure	Cir. spl.	Pressure	Cir. spl.	Spl. pres.	Pressure	Spl. pres.	Pressure	Spl. pres.	Spl. pres.	Pressure
Cooling System	Cent. pump	Centrifugal	Cent. pump	Centrifugal	Centrifugal	Centrifugal	Thermo	Cent. pump	Cent. pump	Cent. pump	Centrifugal
Radiator Type	Cellular	Cell. cast	V. tube	Fin. T. cast	Cell. cast	Cell. sheet	Cellular	Fin. T. cast	Fin. T. cast	V tube	Fin. T. cast
Carburetor	Packard	Stromberg	Pierce-Arrow	Johnson	Stromberg	Rayfield	Stromberg	Stromberg	Stromberg	Stromberg	Master
Ignition, Make	Dixie, Split.	Bosch, Elise.	Bosch, Elise.	National	Bosch	Bosch	Bosch	Rosch	Rosch	Rosch	Eisemann
Type, Control	Single, hand	Single, fixed	Single, hand	Dual, hand	Single, fixed	Single, hand	Single, fixed	Single, auto	Single, hand	Single, fixed	Single, hand
Governor Drive	Motor	Motor	Motor	Motor	Suction	Engine	Motor	Engine	Motor	Motor	Engine
Speed, MPH	14	15	16	15	13	15	18	15	15	15	14
Clutch Type	Dry disc	Dry disc	Cone	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry plate	Dry plate	Dry plate
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Lorated Speeds	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3	Unit-M. 3
Driven by	Top worm	Top worm	Top worm	Top worm	Int. gear	Worm	Top worm	Unit-M. 3	Int. gear	Top worm	Top worm
Ratio Gear Red.	7.25-1	9.00-1	7.00-1	8.75-1	8.00-1	.....	.....	7.75-1	9.45-1	9.25-1	7.75-1
Tor. Taken by	Torsion arm	Torsion rod	Torsion rod	Torque arm	Springs	Springs	Springs	Springs	Torque arm	Springs	Springs
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Springs	Springs	Springs	Springs	Radius rod	Springs	Springs
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	144 in.	144 in.	150, 180 in.	146 in.	144 in.	142 in.	132 in.	165 in.	138 in.	150 in.	160 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x3 1/2, 36x3 1/2d	36x4, 36x4d	36x4, 36x4d	36x4, 36x3 1/2d	34x4, 34x6	34x4, 26x3 1/2	36x4 1/4, 36x6	36x4, 36x6	36x3 1/4, 36x6	36x4, x6, x3 1/2d	36x7, 36x4, 36x7
Driver's Seat	Left	Right	Right	Left	Left	Left	Right	Right	Right	Right	Left
Control Levers	Left, centre	Centre	Right	Centre	Centre	Centre	Right	Centre	Centre	Centre	Centre

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 4000 POUNDS.

Make	Model	Standard	Steele	Stewart	Sullivan	Superior	Thomas	United	Universal	Wichita	Wilcox	Wilson	Winther
Capacity	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Chassis Price	\$2195	\$2250	\$2250	\$2250	\$2250	\$2250	\$2250	\$2250	\$2250	\$2250	\$2250	\$2250	\$2250
S. A. E. Rating	27.20	27.20	27.20	27.20	27.20	27.20	27.20	27.20	27.20	27.20	27.20	27.20	27.20
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right	Right
No. Main Bear	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three
Max. RPM	1050	1150	1600	1500	1100	1100	1125	1125	1100	1050	1200	1100	1100
Lubrication	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.
Cooling System	Water pump	Water pump	Water pump	Water pump	Water pump	Water pump	Water pump	Water pump	Water pump	Water pump	Water pump	Water pump	Water pump
Radiator Type	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast
Carburetor	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler
Ignition, Make	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann	Eisemann
Type, Control	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Governor Drive	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor
Speed, MPH	15	14 1/2	15	17	15	15	15	14	12	13	14	15	16
Clutch Type	Dry disc	Wet disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc
Trans. Gearset	Selective	Ind. clutch	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Amid., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3
Driven by	Top worm	Double chain	Int. gear	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1
Ratio Gear Red.	7.75-1	9.52-1	8.15-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1
Tor. Taken by	Springs	Radius rod	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	140	140	140	140	140	140	140	140	140	140	140	140	140
Wheelbase	140	140	140	140	140	140	140	140	140	140	140	140	140
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Size	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4
Driver's Seat	Left	Right	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left
Control Levers	Centre	Right	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

LOAD CAPACITY, 4500 AND 5000 POUNDS.

Make	Model	Standard	Steele	Stewart	Sullivan	Superior	Thomas	United	Universal	Wichita	Wilcox	Wilson	Winther
Capacity	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Chassis Price	\$1775	\$1900	\$2000	\$2000	\$2000	\$2000	\$2000	\$2000	\$2000	\$2000	\$2000	\$2000	\$2000
S. A. E. Rating	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50	25.50
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left
No. Main Bear	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three
Max. RPM	1200	1500	1500	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Lubrication	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.
Cooling System	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo	Thermo
Radiator Type	Honey, sheet	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast
Carburetor	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler	Schebler
Ignition, Make	Berling	Berling	Berling	Berling	Berling	Berling	Berling	Berling	Berling	Berling	Berling	Berling	Berling
Type, Control	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand
Governor Drive	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft	Drive shaft
Speed, MPH	15	15	15	15	15	15	15	15	15	15	15	15	15
Clutch Type	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3
Driven by	Int. gear	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm
Ratio Gear Red.	8.30-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1	7.75-1
Tor. Taken by	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs
Propelled by	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs	Springs
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	144 in.	144 in.	144 in.	144 in.	144 in.	144 in.	144 in.	144 in.	144 in.	144 in.	144 in.	144 in.	144 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Size	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4	36x4, 36x4
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left	Left
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

LOAD CAPACITY, 5000 POUNDS.

Make	Kelly Spring.	Kelly Spring.	Kleiber	Lamson	Lane	Lange	Larrabee	Maccar	Manly	Moreland	Netco	Old Reliable
Model	K 35	K 36	B	5000	5000	5000	O	H	50	5000	H	5000
Capacity	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Chassis Price	\$3000	\$3000	\$3200	\$2450	\$2700	\$2850	\$2950	\$2950	\$2950	\$2950	\$2950	\$2750
S. A. E. Rating	22.50	22.50	22.50	25.60	25.60	27.20	27.20	27.20	27.20	27.20	27.20	35.00
Engine Cyls.	Four	Four	Four	Four	Six	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	3 3/4 x 5 1/2	3 3/4 x 5 1/2	4 1/2 x 5 1/2	4 x 6	3 3/4 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	Left	Left	Left	Left	Right	Left	Left	Left	Right	Left	Left	T head
No. Main Bear.	Three	Three	Three	.....	Three	.....	Three	Three	Three	Three	Three	Three
Max. RPM	1250	1250	1150	1200	.....	1250	1200	1000	1020	1050	1800	.....
Lubrication	Pressure	Pressure	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Pressure	Spl. pres.	Pressure	Spl. pres.	Spl. pres.	Spl. pres.
Cooling System	Centrifugal	Centrifugal	Cent. pump	Cent. pump	Water pump	Thermo ayp.	Cent. pump	Centrifugal	Cent. pump	Water pump	Water pump	Cent. pump
Radiator Type	Cell. cast	Cell. cast	Cellular	.....	Fin. T. cast	Fin. sheet	Fin. cast	Fin. cast	Tube cast	Fin. sheet	Fin. T. cast	Tube & cast
Carburetor	Rayfield	Rayfield	Schebler	Stromberg	Stromberg	Stromberg	Schebler	Stromberg	Zenith	Ensign	Zenith	Stromberg
Ignition	Elsemann	Elsemann	Bosch	Bosch	Bosch	Bosch	Bosch	Bosch	Elsemann	Dixie	Elsemann	Bosch
Type, Control	Single, fixed	Single, fixed	Single, manual	Dual, hand	Hand	Single	Single, hand	Single, hand	Single	Hand	Single, fixed	Single, hand
Governor Drive	Motor	Motor	Motor	.....	Engine	Motor	Motor	Motor	Motor	.....	.....	.....
Speed, MPH	14	14	14	14	15	15	14	16	14	14	18	16
Clutch Type	Cone	Cone	Wet disc	Wet plate	Dry plate	Wet disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry plate	Wet disc
Trans. Gearset	Selective	Selective	Selective	Ind. clutch	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Unit-J, 3	Unit-J, 3	Aml., 3	Unit-M., 3	Aml., 3	Aml., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Aml., 4	Unit-M., 3	Unit-J, 3
Driven by	Worm	Worm	Top worm	Worm	Top worm	Double chain	Worm	Top worm	Worm	Top worm	Top worm	Double chain
Ratio Gear Red.	11.30-1	11.66-1	8.67-1	.....	7.75-1	9.20-1	8.75-1	7.75-1	8.75-1	6.80-1	9.25-1	8.23-1
Tor. Taken by	Springs	Springs	Springs	Springs	Springs	Radius rod	Springs	Springs	Torsion arm	Springs	Springs	Radius rod
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	144 in.	144 in.	150 in.	160 in.	150 in.	136 in.	154 in.	162 in.	168 in.	144, 168 in.	168 in.	120 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x4, 40x7	36x4, 36x7	36x4, 36x7	24x4, 36x4
Driver's Seat	Left	Left	Right	Left	Left	Left	Left	Left	Left	Left	Left	Right
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Right	Right

LOAD CAPACITY, 5000 POUNDS.

Make	Rennoe-Lealle	Rowe	Royal	Sanford	G. A. Schacht	Sigal	Sterling	Taylor	Time	Time	Tower	Union
Model	.....	CDW	B 2 1/2	W 25	J	J	.....	.....	MC	MW	E	B
Capacity	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Chassis Price	\$3250	\$3000	\$3850	\$2900	\$2835	\$2950	\$2950	\$2900	\$2500	\$2700	\$2722	\$2975
S. A. E. Rating	22.50	25.60	28.90	27.20	27.23	27.20	27.20	27.20	27.20	27.20	27.22	25.60
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	4 1/2 x 5 1/2	4 x 5	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 x 6
Valve Location	.....	.....	Left	Right	Left	Left	Left	Left	Left	Left	Left	Left
No. Main Bear.	.....	.....	Three	Three	Three	Three	Three	.....	Three	Three	Three	Four
Max. RPM	1200	.....	1600	1100	1295	1040	1040	1300	1000	1000	.....	.....
Lubrication	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Clr. spl.	Clr. spl.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Pressure
Cooling System	Centrifugal	Cent. pump	Thermo	Cent. pump	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Cent. pump	Water pump	Water pump
Radiator Type	Fin. cast	Cell. cast	Cellular	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. sheet	Fin. sheet	Fin. T. cast	Fin. T. cast
Carburetor	Stromberg	Stromberg	Stromberg	Stromberg	Schebler	Stromberg	Zenith	Schebler	Schebler	Schebler	Schebler	Schebler
Ignition	Stromberg	Bosch	Bosch	Bosch	Elsemann	Elsemann	Elsemann	Elsemann	Bosch	Bosch	Bosch	Elsemann
Type, Control	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, fixed	Single, manual	Single, manual	Single	Single	Single, fixed	Single, hand
Governor Drive	Motor	.....	Motor	.....	Motor	Motor	Motor	Gear set	Motor	Motor	.....	.....
Speed, MPH	18	15	18	15 1/2	14	15	16	16	11	13	.....	.....
Clutch Type	Dry disc	Dry disc	Dry disc	Dry plate	Dry disc	Dry disc	Dry disc	Dry plate	Cone	Cone	Dry disc	Dry disc
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Unit-M., 4	Unit-M., 4	Aml., 3	Aml., 4	Aml., 3	Unit-M., 3	Unit-M., 3	Aml., 4	Aml., 3	Aml., 3	Unit-M., 3	Unit-M., 3
Driven by	Top worm	Top worm	Top worm	Worm	Top worm	Top worm	Top worm	Worm	Double chain	Worm	Top worm	Int. gear
Ratio Gear Red.	8.60-1	.....	.....	5.00-1	9.25-1	9.25-1	7.70-1	8.80-1	8.80-1	7.70-1	.....	7.75-1
Tor. Taken by	Springs	Springs	Springs	Springs	Worm arm	Springs	Springs	Springs	Springs	Springs	Springs	Springs
Propelled by	Springs	Springs	Springs	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	164 in.	164 in.	132 1/2 in.	156 in.	156 in.	156 in.	156 in.	156 in.	140 in.	140 in.	146 in.	152 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	34x4, 36x4	34x4, 36x4	36x4 1/2, 36x6	36x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x4, 36x4d	36x4, 26x7	36x4, 36x4d	36x4, 36x3 1/2 d	34x4, 34x4d	39x4, 39x6
Driver's Seat	Left	Left	Right	Left	Left	Left	Left	Left	Left	Left	Left	Right
Control Levers	Centre	Centre	Right	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 5000 AND 6000 POUNDS.

Make	Model	U. S.	Wichita	Wisconsin	Witt-Wall	A & B	Beach Creek	Blair	Chase	Demby	F. W. D.	Horner
Model	Model	H	R	C	WD 18	.....	3A	D	X	15	B	F. G.
Capacity	Capacity	5000	5000	5000	5000	6000	6000	6000	6000	6000	6000	6000
Chassis Price	Chassis Price	\$2950	\$2700	\$2500	\$2500	\$3850	\$3850	\$3250	\$3250	\$2525	\$4600	\$3550
S. A. E. Rating	S. A. E. Rating	27.25	22.50	25.50	21.20	42.64	28.90	28.90	27.20	22.50	Four	32.40
Engine Cyls.	Engine Cyls.	Four	Four	Four	Four	Four	Four	Pairs	Four	Four	Four	Four
How Cast	How Cast	Block	Block	Pairs	Block	Pairs	Pairs	Block	Block	Block	Pairs	Pairs
Bore, Stroke	Bore, Stroke	4 1/2 x 5 1/2	3 3/4 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	5.17 x 4 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	3 3/4 x 5	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	Valve Location	Left	Right	Left	4 1/2 x 5 1/2	Right	Left	Left	Right	Right	Opposite	Left
No. Main Bearings	No. Main Bearings	Three	Three	Three	.....	Three	Three	Three	Three	Three	Three	Three
Max. RPM	Max. RPM	1200	1200	1200	1000	.....	1000	1100	1200	1275	1200	1100
Lubrication	Lubrication	Cir. spl.	Pump spl.	Spl. pres.	Spl. pres.	Cir. spl.	Spl. pres.	Cir. spl.	Cir. spl.	Cir. spl.	Spl. pres.	Spl. pres.
Cooling System	Cooling System	Centrifugal	Centrifugal	Water pump	Cent. pump	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Thermo	Centrifugal	Cent. pump
Radiator Type	Radiator Type	Cellular	Cell. cast	Cell. cast	Fin. sheet	Fin. sheet	King	Zenith	Fin. sheet	Cell. cast	Hor. Fin. T.	Fin. P. steel
Carburetor	Carburetor	Stromberg	Stromberg	Elsemann	Schebler	Schebler	Elsemann	Else, auto	Bosch	Stromberg	Stromberg	Master
Ignition, Make	Ignition, Make	Bosch	Bosch	Elsemann	Elsemann	Elsemann	Elsemann	Else, auto	Bosch	Elsemann	Elsemann	Bosch
Ignition, Location	Ignition, Location	Hand and foot	Single, hand	Dual, hand	Dual, hand	Dual, hand	Single, hand	Blair	Single, fixed	Single, fixed	Single, hand	Dual
Governor Drive	Governor Drive	Motor	Engine	Motor	Motor	.....	Motor	Motor	Engine	Motor	Motor	Engine
Speed, MPH	Speed, MPH	15	13	15	14	.....	12	12	12	12 1/2	14	14
Clutch Type	Clutch Type	Cone	Cone	Dry disc	Dry disc	.....	Dry plate	(Md.) Cone	Mult. disc	Dry plate	Hele Shaw	Dry disc
Trans. Gearset	Trans. Gearset	Selective	Selective	Selective	Selective	.....	Selective	Ind. C.	Selective	Selective	Ind. C.	Selective
Located Speeds	Located Speeds	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit, 3	.....	Amid., 6	Amid., 3	Unit-M., 3	Unit-M., 3	Amid., 3	Amid., 3
Driven by	Driven by	Top worm	Top worm	Top worm	Top worm	.....	Bevel	Top worm	Top worm	Int. gear	Bevel, 4	Top worm
Ratio Gear Red.	Ratio Gear Red.	8.75-1	8.75-1	7.70-1	7.70-1	.....	8.00-1	8.00-1	11.75-1	10.90-1	8.90-1	8.40-1
Tor. Taken by	Tor. Taken by	Springs	Springs	Springs	Springs	.....	Springs	Radius rod	Springs	Springs	Torsion rod	Springs
Propelled by	Propelled by	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	Radius rod	Radius rod	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, For	Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	132 in.	121, 135, 144 in.	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	Wheelbase	144, 168 in.	148 in.	156 in.	144 in.	.....	144 in.	144 in.	121, 135, 144 in.	132 in.	144 in.	145 in.
Tire Type	Tire Type	Solid	Solid	Solid	Solid	.....	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	Tire Sizes	34x4, 36x4d	36x4, 36x7	26x4, 36x6	36x3 1/2, 48x3 1/2 d	.....	36x3 1/2, 48x3 1/2 d	36x4, 36x4d	36x4, 36x5d	36x4, 36x7	36x5, 36x6	36x5, 40x5d
Driver's Seat	Driver's Seat	Left	Right	Left	Left	.....	Right	Right	Right	Left	Right	Left
Control Levers	Control Levers	Centre	Centre	Centre	Centre	.....	Centre	Centre	Centre	Centre	Right	Centre

LOAD CAPACITY, 6000 POUNDS.

Make	Model	Manly	Morton	Nel. & Le Moon	Old Reliable	Packard	Peerless	Pull-More	Rennoc-Leslie	Riker	Rowe	Schleicher
Model	Model	60	4 Wheel Drive	E 3	Reliable	3 E	T C 3	.....	Tractor	H	DEW	.....
Capacity	Capacity	6000	6000	6000	6000	6000-7000	6000	6000	6000	6000	6000	6000
Chassis Price	Chassis Price	\$3250	\$3250	\$3250	\$3250	\$3900	\$4000	\$3950	\$3250	.....	\$3400	\$3500
S. A. E. Rating	S. A. E. Rating	28.90	36.15	32.40	28.90	32.40	32.40	Four	27.20	29.00	25.60	29.00
Engine Cyls.	Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	How Cast	Pairs	Pairs	Pairs	Pairs	Block	Pairs	Block	Block	Pairs	Pairs	Pairs
Bore, Stroke	Bore, Stroke	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4x6	4 1/2 x 5 1/2
Valve Location	Valve Location	Left	Left	Left	T head	Right	Opposite	Right	Right	T head	Three	Right
No. Main Bearings	No. Main Bearings	Three	Three	Three	Three	Four	Three	Three	Three	Five	Three	Three
Max. RPM	Max. RPM	1250	1250	1000	.....	1000	925	1050	1200	1350	1000	1200
Lubrication	Lubrication	Spl. pres.	Spl. pres.	Pressure	Spl. pres.	Pressure	Splash	Pressure	Spl. pres.	Spl. pres.	Pressure	Spl. pres.
Cooling System	Cooling System	Centrifugal	Centrifugal	Cent. pump	Tube & cast	Cent. pump	Gear	.....	Cent. pump	Water pump	Cent. pump	Cent. pump
Radiator Type	Radiator Type	Cell. cast	Cell. cast	Sq. T. sheet	Stromberg	Stromberg	Fin. T. cast	.....	Fin. cast	Fin. T. cast	Cell. sheet	Cell. sheet
Carburetor	Carburetor	Stromberg	Stromberg	Stromberg	Bosch	Stromberg	Stromberg	.....	Stromberg	B. & B.	Rayfield	Stromberg
Ignition, Make	Ignition, Make	Elsemann	Elsemann	Elsemann	Dixie, Split.	Dixie, Split.	Remy	.....	Splitdorf	Berling	Bosch	Bosch
Ignition, Location	Ignition, Location	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Dual, hand	.....	Dual	Hand	Single, hand	Dual, hand
Governor Drive	Governor Drive	Motor	Waukesha	Motor	.....	Motor	Motor	.....	Motor	Motor	.....	.....
Speed, MPH	Speed, MPH	13	18	12	16	12	14 1/2	12	18	14 1/2	12	25
Clutch Type	Clutch Type	Dry disc	Wet disc	Dry disc	Wet disc	.....	Cone	Dry disc	Dry disc	Cone	Dry disc	.....
Trans. Gearset	Trans. Gearset	Selective	Selective	Selective	Selective	.....	Unit-J, 4	Selective	Selective	Selective	Selective	.....
Located Speeds	Located Speeds	Unit-M., 4	Unit-M., 3	Unit-M., 3	Unit-J, 4	.....	Unit-J, 4	.....	Amid., 4	Amid., 4	Unit-M., 4	.....
Driven by	Driven by	Top worm	Top worm	Top worm	Double chain	.....	Double chain	.....	Top worm	Top worm	Top worm	Double chain
Ratio Gear Red.	Ratio Gear Red.	8.75-1	5.60-1	8.75-1	8.75-1	.....	7.40-1	9.90-1	8.60-1	10.00-1	.....	.....
Tor. Taken by	Tor. Taken by	Springs	Springs	Radius rod	Radius rod	.....	Springs	.....	Springs	Torsion arm	Springs	.....
Propelled by	Propelled by	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic	.....	1/2 elliptic	1/2 elliptic	1/2 elliptic	Radius rod
Springs, For	Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic	.....	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	151 in.	.....	116 in.	150, 170, 190 in.	1/2 elliptic	1/2 elliptic
Wheelbase	Wheelbase	148 in.	112 in.	Optional	130 in.	.....	156, 186 in.	.....	116 in.	150, 170, 190 in.	1/2 elliptic	150 in.
Tire Type	Tire Type	Solid	Solid	Solid	Solid	.....	Solid	.....	Solid	Solid	Solid	Solid
Tire Sizes	Tire Sizes	36x5, 38x5d	40x6, 40x6	36x5, 38x5d	24x5, 36x5d	.....	36x4, 40x4d	.....	36x5, 36x7	36x5, 36x7	36x5, 36x5d	34x4 1/2, 34x3 1/2 d
Driver's Seat	Driver's Seat	Left	Right	Right	Right	.....	Right	.....	Left	Right	Left	Right
Control Levers	Control Levers	Centre	Centre	Centre	Centre	.....	Centre	.....	Centre	Centre	Centre	Right

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 6000 AND 7000 POUNDS.

Make	United F. W. D. White	Winther	Jacobsen	Armo	American	Armleder	Atterbury	Available	Remsemer	Hourne
Model	B	68	L	C	30	K W	7D	C 3	K	X M
Capacity	6000	6000	7000	7000	7000	7000	7000	7000	7000	7000
Chassis Price	\$4500	\$3600	\$3500	\$3500	\$3500	\$3500	\$3775	\$3650	.....	\$4200
S. A. E. Rating	34.30	25.60	28.90	32.40	32.40	32.50	36.15	32.40	Four	28.90
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Pairs	Pairs	Pairs	Pairs	Pairs	Pairs	Pairs	Block
Bore, Stroke	4"x6"	4"x6"	4"x6 1/2"	4"x6 1/2"	4"x6 1/2"	4"x6 1/2"	4"x6 1/2"	4"x6 1/2"	4 1/2"x6 1/2"	4 1/2"x6 1/2"
Valve Location	Head	Right	Left	Left	Right	Left	Left	Left	Left	Left
No. Main Bear.	Three	Four	Three	Three	Three	Three	Three	Three	Three	Five
Max. RPM	1110	1200	1200	1200	1143	1500	1125	1200	1250	1100
Lubrication	Spl. pres.	Pressure	Spl. pres.	Spl. pres.	Spl. pres.	Clr. spl.	Spl. pres.	Clr. spl.	Clr. spl.	Force feed
Cooling System	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Centrifugal	Cent. pump	Centrifugal	Water pump	Water pump
Radiator Type	Fin. cast	Tube cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Fin. cast	Cell. sheet	Cell. cast	Cell. cast
Carburetor	Rayfield	Master	Rayfield	Rayfield	Stromberg	Schebler	Zenith	Stromberg	Rayfield	Zenith
Ignition, Make	At. Kent	Eisemann	Eisemann	Eisemann	Eisemann	Schebler	Eisemann	Dixie	Dixie	Eisemann
Type, Control	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Dual, fixed	Hand	Fixed
Governor Drive	Motor	.....	Transmission	Motor	Motor	.....	Motor	Motor	Motor	Engine
Speed, MPH	12	15	14	14	14	13	13	14	12	12
Clutch Type	Wet disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Single disc	.....
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	.....
Located Speeds	Unit-J, 3	Amid., 4	Unit-M, 4	Amid., 3	Amid., 4	Unit-M, 3	Unit-M, 4	Unit-M, 3	Amid., 4	.....
Driven by	Double chain	Int. gear	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Int. gear	Top worm
Ratio Gear Red.	9.21-1	10.00-1	10.33-1	10.33-1	8.75-1	8.75-1	10.33-1	10.33-1	Optional	10.33-1
Tor. Taken by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	130 in.	150 in.	168 in.	168 in.	158 in.	156, 186 in.	167 1/2 in.	Optional	150, 175 in.	160 in.
Wheelbase	127 in.	130 in.	168 in.	168 in.	158 in.	156, 186 in.	167 1/2 in.	Optional	150, 175 in.	160 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x7, 36x7	36x5, 40x5d	36x5, 40x8	36x5, 40x8	36x5, 36x5d	36x5, 36x5d	36x5, 40x5d	36x5, 40x5d	26x5, 36x5d	36x5, 36x5d
Driver's Seat	Right	Right	Left	Left	Left	Left	Right	Left	Left	Left
Control Levers	Right	Centre, left	Centre	Centre	Centre	Centre	Right	Centre	Centre	Left

LOAD CAPACITY, 7000 POUNDS.

Make	Harford	Chase	Hydendale	Continental	Corbitt	Comple-Gear	Dart	Dayton	Dayton	Diamond T	Daplex
Model	DS	O	90	M	A	HC	L	K	K	L B	D
Capacity	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
Chassis Price	\$3600	\$3600	\$3600	\$3300	\$3800	\$5600	\$3400	\$3400	\$3400	\$3950	\$4000
S. A. E. Rating	32.40	32.40	32.40	32.40	32.50	53.00	32.40	26.10	29.00	32.40	29.00
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Pairs	Pairs	Pairs	Single	Block	Pairs	Block	Pairs	Block
Bore, Stroke	4 1/2"x6"	4 1/2"x6"	4 1/2"x5 1/2"	4 1/2"x5 1/2"	4 1/2"x5 1/2"	5 1/2"x7"	4 1/2"x6"	4 1/2"x5 1/2"	4 1/2"x6"	4 1/2"x5 1/2"	4 1/2"x5 1/2"
Valve Location	Right	Right	Left	Left	Left	Head	Right	T head	.....	Left	.....
No. Main Bear.	.....	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three
Max. RPM	1000	1200	1180	.....	1500	1500	1100	1000	.....	.....	940
Lubrication	Spl. pres.	Clr. spl.	Clr. spl.	Pressure	Clr. spl.	Spl. pres.	Pressure	Pressure	Clr. spl.	.....	.....
Cooling System	Water pump	Centrifugal	Centrifugal	Cent. pump	Centrifugal	Thermo syp.	Cent. pump	Cent. pump	Cell. cast	Pressure	.....
Radiator Type	Cell. cast	Fin. cast	Tube cast	Cell. cast	Fin. T. cast	Cell. cast	Cell. cast	Fin. cast	Sq. T. sheet	Cell. cast	.....
Ignition, Make	Zenith	Stromberg	Zenith	Stromberg	Stromberg	Stromberg	Master	Stromberg	Miller	Schebler	.....
Type, Control	Single	Single, fixed	Hand	Single	Single, hand	Single, foot	Eisemann	Bosch	Bosch	Eisemann	.....
Governor Drive	.....	Motor	Motor	Motor	Motor	.....	Dual, hand	Dual, hand	Single, hand	Single, hand	.....
Speed, MPH	13	14	12	18	12	10	12	.....	13	12	.....
Clutch Type	Disc	Dry disc	Disc	Dry disc	Wet disc	.....	Dry disc	Dry disc	Dry disc	Plate	.....
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	.....
Located Speeds	Amid., 4	Unit-M, 4	Amid., 4	Unit-M, 3	Amid., 3	.....	Amid., 4	Unit-J, 3	Amid., 4	Amid., 6	.....
Driven by	Top worm	Top worm	Top worm	Top worm	Top worm	Bevel gear	Top worm	Double chain	Top worm	Top worm	.....
Ratio Gear Red.	13.10-1	8.75-1	10.33-1	10.50-1	8.67-1	25.00-1	10.75-1	9.40-1	8.75-1	16.00-1	.....
Tor. Taken by	Springs	Springs	Springs	Springs	Springs	Radius rod	Springs	.....	Torsion arm	Torsion arm	.....
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Springs	Radius rod	Springs	Radius rod	.....
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....
Springs, Rear	175 in.	175 in.	170, 180 in.	168 in.	168 in.	144 in.	160 in.	136 in.	170, 180 in.	130 in.	.....
Wheelbase	120, 164 in.	175 in.	170, 180 in.	168 in.	168 in.	144 in.	160 in.	.....	170, 180 in.	130 in.	.....
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	.....
Tire Sizes	36x5, 38x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d	36x5d, 36x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d	.....
Driver's Seat	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	.....
Control Levers	Centre	Centre	Right	Centre	Centre	Centre	Centre	Centre	Centre	Centre	.....

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 7000 POUNDS.

Make	Federal	Gabriel	Garford	Gary	Gramm-Bern.	Hahn	Hall	Harrison	Harvey
Model	W	F	77 B	K	71	G. M. C.	C	F	W H A
Capacity	7000	7000	\$3900	1000	7000	7000	7000	7000	7000
Chassis Price	\$3350	\$3750	\$3900	.....	.....	.....	.....	.....	\$3850
S. A. E. Rating	28.90	45.00	29.00	32.40	32.40	32.40	32.40	32.40	32.40
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Block	Block	Block	Block	Block	Block	Block	Block
Bore, Stroke	4 1/2 x 5 1/2	4 1/2 x 6	4 1/2 x 6	4 1/2 x 6	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5	4 1/2 x 6
Valve Location	Right	Left	Left	Right	Left	Left	Left	Right	Right
No. Main Beams	Three	Three	Four	Three	Three	Three	Five	Three	Three
Max. RPM	1150	1200	1000	1100	1100	1175	1150	1000	1000
Lubrication	Pressure	Pressure	Pressure	Pressure	Pressure	Spl. pres.	Pressure	Pressure	Pressure
Cooling System	Cent. pump	Centrifugal	Centrifugal	Cent. pump	Centrifugal	Cent. pump	Cent. pump	Cent. pump	Centrifugal
Radiator Type	Fin. sheet	Cell. sheet	Tubular	Cell. sheet	Fin. T. cast	Fin. T. cast	Fin. cast	Cell. sheet	Fin. T. cast
Carburetor	Zenith	Rayfield	Rayfield	Stromberg	Stromberg	Stromberg	Zenith	Schebler	Stromberg
Ignition, Mkn.	Elsemann	Bosch	Bosch	Elsemann	Elsemann	Elsemann	Bosch	Bosch	Elsemann
Type, Control	Single, fixed	Single, hand	Single, hand	Single, auto	Single, hand	Single, hand	Single, auto	Hand	Single, auto
Governor Drive	Motor	Motor	Motor	.....	Engine	.....	Engine	Motor	Duplex
Speed, MPH	12	12	12	12	16	15	15	12	13
Clutch Type	Dry plate	Dry plate	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Cone	Dry disc
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located by	Unit-M., 4	Amid., 4	Amid., 4	Amid., 4	Amid., 4	Unit-M., 3	Unit-M., 3	Unit-J., 3	Amid., 4
Driven by	Top worm	Top worm	Top worm	Top worm	Worm	Top worm	Top worm	Double chain	Top worm
Ratio Gear Red.	10.33-1	8.50-1	10.33-1	8.75-1	8.70-1	8.70-1	.....	9.40-1	8.75-1
Tor. Taken by	Spring	Radius rod	Spring	Spring	Spring	Spring	Spring	.....	Spring
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Spring
Spring, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic
Spring, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	.....	1/2 elliptic
Wheelbase	144, 172, 190 in.	160 in.	128 in.	162 in.	158 in.	148 in.	144 in.	.....	160 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x5, 36x5d	36x5, 36x5d	36x5, 40x5	26x5, 36x5d	36x5, 40x5d	36x5, 40x5d	36x5, 36x5d	37x5, 37x5d	36x5, 36x5d
Driver's Seat	Left	Left	Right	Left	Left	Left	Left	Right	Left
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

LOAD CAPACITY, 7000 POUNDS.

Make	Hendrickson	Hercules	Harburt	Indiana	Kelly Springs	Kling	Kiesel	Kielber	Lamson	Lane	Larrabee	Little Giant
Model	H	High. Special	3	R	K 40	K 40	Kiesel	C	Lamson	C	R	17
Capacity	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
Chassis Price	\$3000	\$3750	\$4150	\$3200	\$3850	\$3000	\$3550	\$3850	\$3150	\$3500	\$3650	.....
S. A. E. Rating	32.40	33.75	32.40	23.90	32.40	32.40	28.90	32.40	36.20	32.40	32.40	32.40
Engine Cyls.	Four	Six	Four	Four	Four	Four	Four	Four	Four	Six	Four	Four
How Cast	Pairs	Pairs	Block	Pairs	Pairs	Pairs	Block	Pairs	Pairs	Three	Block	Pairs
Bore, Stroke	3 1/2 x 5 1/2	3 1/2 x 5 1/2	4 1/2 x 6	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	3 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	.....	L head	Right	Left	Opposite	Left	Right	Left	.....	Right	Left	Left
No. Main Beams	Three	Three	Three	Three	Three	Three	Three	Three	.....	Three	Three	Three
Max. RPM	1100	1150	1200	1200	1150	1000	1245	1150	1200	1200	1200	1100
Lubrication	Spl. pres.	Spl. pres.	Pressure	Spl. pres.	Pressure	Spl. pres.	Pressure	Spl. pres.	Spl. pres.	Spl. pres.	Pressure	Pump, spl.
Cooling System	Cent. pump	Cent. pump	Water pump	Cent. pump	Centrifugal	Centrifugal	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump
Radiator Type	Fin. cast	Cell. cast	Fin. tube	Fin. T. cast	Cell. cast	Cell. sheet	Cell. sheet	Cell. cast	Cell. cast	Fin. T. cast	Fin. cast	Cell. cast
Carburetor	Stromberg	Rayfield	Fletcher	Stromberg	Rayfield	Stromberg	Stromberg	Schebler	Stromberg	Stromberg	Schebler	Stromberg
Ignition, Mkn.	Dixie	Berling	Elsemann	Bosch	Elsemann	Elsemann	Elsemann	Bosch	Bosch	Battery	Bosch	Elsemann
Type, Control	Single	Single, fixed	Dual	Single, hand	Single, auto	Single, auto	Single, hand	Single, manual	Single, manual	Single, hand	Single, hand	Single, hand
Governor Drive	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor	.....	Engine	Motor	.....
Speed, MPH	14	13	13	12	13	12	13	17	12	12	17	12
Clutch Type	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Dry plate	Wet disc	Dry plate	Dry plate	Dry disc	Dry disc
Trans. Gearset	Progressive	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located by	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 3	Unit-M., 4	Unit-M., 4	Unit-M., 3	Unit-M., 3	Unit-M., 4	Unit-M., 4
Driven by	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm
Ratio Gear Red.	10.30-1	11.23-1	8.66-1	10.25-1	10.50-1	8.62-1	10.33-1	8.67-1	11.70-1	11.75-1	11.50-1	10.33-1
Tor. Taken by	Spring	Radius rod	Torsion arm	Spring	Spring	Spring	Spring	Spring	Spring	Spring	Spring	Spring
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod
Spring, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Spring, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	160 in.	146 in.	146 in.	156 in.	150 in.	120 in.	168 in.	160 in.	170 in.	160 in.	154 in.	176 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x5, 36x5d	36x5, 40x5d	36x5, 36x5d	36x5, 36x5d	36x5, 38x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d	36x5, 40x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Right	Left	Left	Left	Right
Control Levers	Right	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINE WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 7000 POUNDS.

Make	Mack	Master	Master	Menominee	Oneda	Republ	Royal	Sanford	G. A. Schacht	Seiden
Model	AC	A 1	A	G	D	T	A 3 1/2	W 35	.....	N L
Capacity	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
Chassis Price	\$4250	\$3150	\$3390	\$3540	\$3600	\$2950	\$3600	\$3700	\$3700	\$3700
S. A. E. Rating	40.00	28.90	28.90	32.40	32.40	28.90	32.40	32.40	32.40	32.40
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Pairs	Block	Block	Pairs	Pairs	Block	Block	Pairs	Block	Pairs
Bore, Stroke	5x6	4 1/2 x 6	4 1/2 x 6	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 6	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	Right	.....	.....	Right	Left	Right	.....	Left	R. & H.	Left
Max. Main Bear.	Three	.....	.....	Three	Three	Three	Three	Three	Three	Three
No. Main Bear.	1000	1100	1100	.....	1150	1100	1600	1100	1000	1250
Lubrication	Spl. pres.	Pressure	Pressure	Spl. pres.	Spl. pres.	Spl. pres.	Pressure	Spl. pres.	Spl. pres.	Spl. pres.
Cooling System	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump
Radiator Type	Ring cast	Cell. cast	Cell. cast	Tubular	Fin. cast	Centrifugal	Cell. cast	Fin. cast	Fin. cast	Fin. T. cast
Carburetor	Stromberg	Master	Master	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg
Ignition, Make	.....	Elsemann	Elsemann	Elsemann	Bosch	Bosch	Bosch	Bosch	Bosch	Elsemann
Type, Control	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, fixed	Single, auto	Single, hand	Single, manual
Governor Drive	Motor	Engine	Engine	Gear set	Motor	Suction	Motor	.....	Motor	Motor
Speed, MPH	.....	.....	.....	.....	.....	11	15	13	12	13
Clutch Type	.....	Dry disc	Dry disc	Wet disc	Wet disc	Dry disc	Dry disc	Dry disc	Cone	Dry disc
Trans. Gearset	.....	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	.....	Amid., 4	Amid., 4	Amid., 3	Amid., 4	Unit-M., 4	Unit-M., 3	Amid., 4	Amid., 3	Unit-M., 4
Driven by	.....	Top worm	Top worm	Top worm	Top worm	Int. gear	Top worm	Top worm	Top worm	Top worm
Ratio Gear Red.	7.54-1	9.00-1	9.00-1	10.30-1	10.30-1	10.00-1 opt.	.....	8.75-1	5.00-1	9.67-1
Tor. Taken by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Propelled by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springs, For	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springs, Rear	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wheelbase	174 in.	158 in.	158 in.	160 in.	160 in.	165 in.	158 in.	174 in.	168 in.	164 in.
Tire Type	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tire Sizes	36x5, 40x5d	36x5, 40x5d	36x5, 40x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d	36x5, 38x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d
Driver's Seat	Left	Left	Left	Left	Left	Left	Right	Left	Left	Right
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Right	Centre	Centre	Centre

LOAD CAPACITY, 7000 POUNDS.

Make	Service	Standard	Sterling	Taylor	Thomson	Timb	United	U. S.	U. S.	U. S.
Model	275	65	.....	.....	70	PW	CSW	D	J	L
Capacity	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
Chassis Price	\$3900	\$3350	.....	.....	.....	\$3400	\$3450	\$3350	\$3650	\$3600
S. A. E. Rating	32.40	32.40	29.00	32.40	28.90	32.40	32.40	32.40	32.40	32.40
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Block	Pairs	Pairs	Block	Block	Pairs	Pairs	Pairs	Pairs	Pairs
Bore, Stroke	4 1/2 x 6	4 1/2 x 5 1/2	4 1/2 x 6 1/2	4 1/2 x 5 1/2	4 1/2 x 6	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	Right	Left	Left	.....	.....	Left	Left	Left	Left	Left
No. Main Bear.	Three	Three	Three	.....	Three	Three	Three	Three	Three	Three
Max. RPM	1200	1050	1040	1230	.....	1000	980	1190	1100	1100
Lubrication	Pressure	Spl. pres.	Clr. spl.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Clr. spl.	Clr. spl.	Spl. pres.
Cooling System	Centrifugal	Water pump	Centrifugal	Cent. pump	Cent. pump	Centrifugal	Centrifugal	Centrifugal	Cent. pump	Cent. pump
Radiator Type	Fin. cast	Fin. T. cast	Fin. cast	Fin. cast	Fin. sheet	Fin. sheet	Cell. sheet	Cellular	Fin. cast	Fin. cast
Carburetor	Master	Schebler	Zenith	Zenith	Stromberg	Schebler	Stromberg	Stromberg	Zenith	Stromberg
Ignition, Make	.....	Elsemann	Elsemann	Elsemann	Stromberg	Bosch	Stromberg	Bosch	Stromberg	Stromberg
Type, Control	Single, hand	Single, auto	Dual, manual	Dual	Single	Single	Single, fixed	Dual, hand	Single, hand	Single, hand
Governor Drive	Engine	Motor	Motor	Gear set	Gear set	Motor	Motor	Motor	Motor	Motor
Speed, MPH	12	12	13, 15	15	12	Nine	12	13	12	14
Clutch Type	.....	Dry plate	Wet disc	Dry plate	Dry plate	Cone	Dry disc	Cone	Dry disc	Dry disc
Trans. Gearset	.....	Selective	Selective	Selective	Selective	Selective	Selective	Ind. C.	Selective	Selective
Located Speeds	.....	Amid., 4	Amid., 3	Amid., 4	Unit-M., 3	Amid., 3	Unit-M., 3	Amid., 3	Amid., 4	Amid., 4
Driven by	.....	Top worm	Top worm	Top worm	Top worm	Top worm	Top worm	Double chain	Top worm	Top worm
Ratio Gear Red.	7.80-1	10.33-1	8.75-1	8.80-1	.....	11.70-1	8.70-1	8.01-1	11.75-1	10.30-1
Tor. Taken by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Propelled by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springs, For	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springs, Rear	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wheelbase	171 in.	158, 170 in.	152 in.	156 in.	150 in.	156 in.	144 in.	150, 162, 174 in.	174 in.	172 in.
Tire Type	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tire Sizes	36x5, 36x5d	36x5, 36x5d	36x4, 40x5d	36x5, 40x10	36x5, 34x5d	36x5, 36x5d	36x5, 36x5d	36x5, 36x5d	36x5, 40x5d	36x5, 40x5d
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Left	Left	Right
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 7000 AND 8000 POUNDS.

Make	Ward	Wichita	Willcox	Wilson	Acme	Kelly	Spring	Moreland	Old	Reliable	Packard	Peerless	Riker
Model
Capacity	7000	7000	7000	7000	8000	8000	8000	8000	8000	8000	8000-9000	T C 4	BB
Chassis Price	\$3600	\$3600	\$3600	\$3600	\$4000	\$4000	\$4000	\$4000	\$4000	\$4000	\$4375	\$4150	8000
S. A. E. Rating	42.20	42.40	42.40	42.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	32.40	28.90
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast
Bore, Stroke	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location
No. Main Bearings
Max. RPM	1000	1200	1200	1100	1200	1150	1150	1000	1000	1000	1000	925	1350
Lubrication
Trana. Gearset
Located System
Cent. pump
Rad. Type
Cell. sheet
Stromberg
Ignition, Make
Dual
Governor Drive
Motor
Speed, MPH
Clutch Type
Trans. Gearset
Located System
Amid., 3
Driven by
Bevel
Ratio Gear Red.	9.80-1	11.75-1	11.70-1	8.75-1	13.66-1	10.70-1	10.70-1	7.80-1	8.14-1	8.75-1	10.00-1	8.70-1	10.00-1
Tor. Taken by
Propelled by
Springs
For
1/2 elliptic
Springs, Rear
1/2 elliptic
Wheelbase	140 in.	165 in.	154 in.	160 in.	168 in.	150 in.	150 in.	162, 186 in.	126 in.	126 in.	156, 186 in.	151 in.	150, 170, 190 in.
Tire Type
30x6, 36x6
Left
Driver's Seat
Right
Control Levers
Centre

LOAD CAPACITY, 8000 POUNDS.

Make	Signal	Steele	United	Winther	Acme	A & B	Available	Blair	Clydesdale	Corbitt	Couple-Gear	Dayton
Model
Capacity	8000	8000	8000	8000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Chassis Price	\$3825	\$3500	\$3450	\$4200	\$4600	\$4600	\$4600	\$4250	\$4250	\$4500	\$4500	\$4500
S. A. E. Rating	32.40	40.00	32.40	28.90	32.40	32.40	32.40	32.40	32.40	32.40	32.40	44.20
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast
Bore, Stroke	4 1/2 x 5 1/2	5x5	4 1/2 x 5 1/2	4 1/2 x 6	4 1/2 x 6	4 1/2 x 6	4 1/2 x 6	4 1/2 x 6	4 1/2 x 6	4 1/2 x 6	4 1/2 x 6	5 1/2 x 7
Valve Location
No. Main Bearings
Max. RPM	1200	950	980	1200	1000	1000	1175	1000	1170	1200	1500	1000
Lubrication
Centrifugal
Cell. sheet
Stromberg
At Kent
Ignition, Make
Elsemann
Type, Control
Single, fixed
Governor Drive
Motor
Speed, MPH
Clutch Type
Trans. Gearset
Located System
Amid., 4
Driven by
Double chain
Ratio Gear Red.	10.33-1	9.21-1	8.70-1	12.50-1	11.67-1	28.00-1	11.75-1	9.33-1	13.67-1	9.75-1	25.00-1	12.00-1
Tor. Taken by
Propelled by
Springs
For
1/2 elliptic
Springs, Rear
1/2 elliptic
Wheelbase	168 in.	127 in.	144 in.	156 in.	172 in.	144 in.	168 in.	135, 144 in.	170, 180 in.	168 in.	144 in.	148 in.
Tire Type
30x6, 40x6
Left
Driver's Seat
Right
Control Levers
Centre

LOAD CAPACITY, 10,000 POUNDS.

Acsonom	A & B	Available	Blair	Clydesdale	Corbitt	Couple-Gear	Dayton
M	5 J	D 5	F	120	A A	A C	M
10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
\$4600	\$4600	\$4600	\$4250	.....	\$4500	\$6400	\$4500
32.60	42.64	32.40	32.40	32.40	32.40	44.10	44.20
Four	Four	Four	Four	Four	Pairs	Single	Pairs
4 1/2 x 6 3/4	5.17 x 4 3/4	4 1/2 x 5 1/2	4 1/2 x 6 3/4	4 1/2 x 5 1/2	4 3/4 x 5 1/2	5 1/4 x 7	5 1/4 x 7
Left	Right	Right	Left	Left	Left	Head	T head
Three	Three	Three	Three	Three	Three	Three	Three
1000	.....	1175	1000	1170	1200	1500	1000
Splash	Clr. spl.	Clr. spl.	Clr. spl.	Clr. spl.	Spl. pres.	Spl. pres.	Pressure
Cent. pump	Gear	Centrifugal	Centrifugal	Centrifugal	Cent. pump	Thermo	Cent. pump
Cell. cast	Fin. sheet	Cellular	Z. Z. T. cast	Tube cast	Fin. T. cast	Cell. cast	Fin. cast
Stromberg	Schebler	Stromberg	Zenith	Zenith	Stromberg	Stromberg	Stromberg
Elsemann	Bosch	Bosch	Elsemann	Lauraine	Elsemann	Elsemann	Bosch
Single, hand	Dual, hand	Single, fixed	Single, hand	Motor	Single, hand	Single, foot	Dual, hand
Motor	.....	Motor	Motor	Motor	Engine	.....	Duplex
10	.....	12	10	10	10	10	16
Dry disc	.....	Dry disc	Cone	Disc	Wet disc	.....	Wet disc
Selective	.....	Selective	Ind. C.	Selective	Selective	.....	Selective
Unit-M., 4	.....	Unit-M., 3	Amld., 3	Amld., four	Amld., 3	Amld., 1	Unit-J., 3
Top worm	Int. G. F.	Worm	Top worm	Top worm	Top worm	Revel gear	Double chain
11.67-1	28.00-1	11.75-1	9.33-1	13.67-1	9.75-1	25.00-1	12.00-1
Springs	Radius rod	Springs	Sub.-F., R.	Springs	Springs	Radius rod	.....
Springs	Radius rod	Radius rod	Sub.-F., R.	Radius rod	Springs	Radius rod	Radius rod
1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
172 in.	144 in.	168 in., opt.	135, 144 in.	170, 180 in.	168 in.	144 in.	Platform
Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
36x6, 40x6d	48x3 1/2 d., 48x6d	36x6, 40x6d	35x6, 36x6d	35x6, 40x6d	35x6, 26x6d	36x5d, 36x5d	36x6, 42x5d
Right	Right	Right	Right	Right	Left	Right	Left
Centre	Centre	Centre	Right	Right	Centre	Centre	Centre

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 10,000 POUNDS.

Make	Deaby	Diamond T	Fageol	Federal	Garford	G. M. C.	Gramm-Hera.	Hall	Hall	Harvey	Hercules	Horner
Model	210	R	.....	X	48	101	.....	.....	.....	W K A	.....	F
Capacity	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Chassis Price	\$4750	\$4750	\$5000	\$4400	\$4700	\$4700	\$4700	\$4700	\$4750	\$4600	\$4750	\$4750
S. A. E. Rating	32.40	32.40	36.10	28.90	36.15	32.40	32.40	32.40	32.40	32.40	33.75	44.20
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Six	Four
How Cast	Pairs	Pairs	Pairs	Block	Pairs	Pairs	Pairs	Pairs	Pairs	Block	Pairs	Pairs
Bore, Stroke	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 6 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 6 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 6 1/2	3 1/2 x 5 1/2	5 1/2 x 5 3/4
Valve Location	Left	Left	L head	Right	Opposite	Left	Left	Left	Left	Right	L head	T head
No. Main Bear.	Three	Three	Three	Five	Three	Three	Three	Five	Five	Three	Three	Three
Max. RPM	1000	1000	1000	1150	1000	1150	1050	1150	1150	1000	1275	1000
Lubrication	Spl. pres.	Cir. spl.	Spl. pres.	Pressure	Pressure	Spl. pres.	Pressure	Pressure	Pressure	Pressure	Spl. pres.	Spl. pres.
Cooling System	Cent. pump	Centrifugal	Cent. pump	Cent. pump	Centrifugal	Centrifugal	Pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump
Radiator Type	Fin. T. cast	Cell. cast	Cell. cast	Fin. sheet	Tabular	Fin. T. cast	Cell. cast	Fin. cast	Fin. cast	Fin. T. cast	Cell. cast	Fin. T. steel
Carburetor	Stromberg	Miller	Zenith	Zenith	Rayfield	Marvel	Zenith	Zenith	Zenith	Stromberg	Rayfield	Master
Ignition, Make	Eisemann	Bosch	Spltdorf	Eisemann	Bosch	Eisemann	Eisemann	Bosch	Bosch	Eisemann	Berling	Bosch
Type, Control	Single, hand	Single, hand	Single, hand	Single, fixed	Single, hand	Single, hand	Single, hand	Single, auto	Single, auto	Single, auto	Single, fixed	Dual, hand
Governor Drive	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Motor	Engine	Engine	Engine
Speed, MPH	10	10	10	.....	10	10	11	12	12	11	12	10
Clutch Type	Dry disc	Dry disc	Dry plate	Dry plate	Dry disc	Dry disc	Cone	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Amid., 4	Unit-M., 3	Unit-M., 3	Amid., 4	Unit-J., 4	Amid., 4	Worm	Unit-M., 4	Unit-M., 3	Amid., 4	Unit-M., 3	Amid., 2
Driven by	Int. gear	Top worm	Top worm	Worm	Double chain	Top worm	Worm	Top worm	Double chain	Top worm	Top worm	Top worm
Ratio Gear Red.	12.50-1	13.67-1	11.67-7	13.67-1	11.53-1	13.66-1	9.50-1	.....	.....	8.75-1	12.67-1	12.40-1
Tor. Taken by	Springs	Springs	Springs	Springs	Radius rod	Springs	Springs	Springs	Springs	Springs	Springs	Springs
Propelled by	Springs	Springs	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	Platform
Wheelbase	170 in.	170 in.	144, 172, 190 in.	156 in.	128 in.	163, 187 in.	168 in.	144 in.	144 in.	160 in.	168 in.	156 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x6, 40x12	36x6, 40x6d	36x6, 40x6d	36x6, 40x6	36x6, 40x6d	36x6, 40x6d	36x6, 40x6d	36x5, 36x5d	36x5, 40x6d	36x6, 40x6d	36x5, 40x6d	38x5, 40x6d
Driver's Seat	Left	Right	Left	Left	Right	Left	Left	Left	Left	Left	Left	Left
Control Levers	.....	Centre	Centre	Centre	Right	Centre	Centre	Centre	Centre	Centre	Left, centre	Centre

LOAD CAPACITY, 10,000 POUNDS.

Make	Hurlburt	Indiana	Kelly Spring.	Kielther	K. T. T.	Lapeer	Mac	Manominee	Moreland	Net. & Le Moon	Old Reliable
Model	.....	L	K 50	D	.....	C	AB	J	.....	E5	.....
Capacity	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Chassis Price	\$5000	\$4200	\$4600	\$4900	\$5000	\$2200	\$3100	\$4540	\$5000	\$3950	\$4250
S. A. E. Rating	33.70	36.10	32.40	44.10	28.90	19.60	25.60	40.00	36.10	32.40	36.15
Engine Cyls.	Six	Four	Four	Four	Four	Block	Four	Four	Four	Four	Four
How Cast	Block	Pairs	Pairs	Pairs	Pairs	Block	Pairs	Pairs	Pairs	Block	Pairs
Bore, Stroke	3 1/2 x 5 1/2	4 1/2 x 6 1/2	4 1/2 x 6 1/2	3 1/2 x 5 1/2	4 1/2 x 5 1/2	3 1/2 x 5 1/2	4x5	5x5 1/2	4 1/2 x 6 1/2	4 1/2 x 6 1/2	4 1/2 x 5 1/2
Valve Location	.....	Left	Opposite	T head	T head	Right	Right	Right	Left	Right	Opposite
No. Main Bear.	.....	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three
Max. RPM	1360	1200	1150	1100	1800	1000	1275	.....	1000	1000	.....
Lubrication	Pressure	Spl. pres.	Pressure	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.
Cooling System	Centrifugal	Cent. pump	Centrifugal	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Centrifugal
Radiator Type	Fin. cast	Honey, cast	Cell. cast	Cell. cast	Honey, cast	Cell. cast	Cell. sheet	Cell. sheet	Cell. sheet	Sq. T. sheet	Fin. sheet
Carburetor	Shakespeare	Stromberg	Rayfield	Schebler	Rayfield	Stewart	Stromberg	Stromberg	Design	Stromberg	Stromberg
Ignition, Make	Dixie	Bosch	Eisemann	Bosch	Bosch	Spltdorf	Spltdorf	Eisemann	Dixie	Eisemann	Bosch
Type, Control	Dual	Single, hand	Single, hand	Single, hand	Single, hand	Single	Single	Single, hand	Single, hand	Dual	Single, hand
Governor Drive	Motor	Motor	Motor	Motor	.....	Motor	Motor	Gear set	.....	Motor	.....
Speed, MPH	12	11	11	12	10 1/5	Eight	.....	10	Nine	10	12
Clutch Type	Dry disc	Dry plate	Cone	Wet disc	Cone	Dry disc	Dry disc	Dry disc	Dry disc	Dry disc	Wet disc
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Unit-M., 4	Amid., 4	Unit-J., 3	Amid., 4	Amid., 4	Unit-M., 3	Unit-M., 4	Amid., 3	Amid., 4	Unit-M., 3	Unit-J., 3
Driven by	Worm	Top worm	Double chain	Top worm	Int. gear	Top gear	Double chain	Double chain	Top worm	Top worm	Double chain
Ratio Gear Red.	10.30-1	8.75-1	12.00-1	8.67-1	18.80-1	13.00-1	13.00-1	13.33-1	8.80-1	11.67-1	8.82-1
Tor. Taken by	Torsion arm	Springs	Springs	Springs	Torsion rod	Springs	Radius rod	Radius rod	Springs	Springs	Radius rod
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Springs	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	156 in.	167 in.	150 in.	170 in.	138 in.	90 in.	120 in.	160 in.	192 in.	Optional	126 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x6, 40x6d	36x6, 40x6d	36x6, 40x6d	36x6, 36x6d	37x7, 37x7	34x3 1/2, 34x3 1/2	36x4 1/2, 36x4 1/2	36x6, 40x6d	36x6, 40x6d	36x6, 40x6d	36x3, 36x6d
Driver's Seat	Left	Left	Left	Right	Left	Left	Left	Left	Left	Right	Right
Control Levers	.....	Centre	Centre	Centre	Left	Centre	Centre	Centre	Centre	Centre	Right

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINEED WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

LOAD CAPACITY, 10,000 POUNDS.

Make	Peerless	Pierce-Arrow	Republic	Rowe	Royal	Sanford	G. A. Schacht	Schleicher	Service	Signal	Standard
Model	T C 4	R 8	V	FW	A 5	W 50	.....	.....	300	R	SS
Capacity	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Chassis Price	\$4700	\$5500	\$4250	\$4500	\$4500	\$4600	\$4700	\$4500	\$4600	\$4475	\$4250
S. A. E. Rating	40	38.25	32.40	36.20	36.10	32.40	28.90	40.00	32.40	22.40	32.50
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	Pairs	Pairs	Block	Pairs	Pairs	Pairs	Block	Pairs	Block	Pairs	Pairs
Horse Stroke	4 1/2 x 6 1/2	4 1/2 x 6	4 1/2 x 6	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	Opposite	T head	Right	T head	T head	Right	Right	Right	Right	Left	Left
No. Main Bear.	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three
Max. RPM	925	950	.....	.....	900	1100	1000	1200	1200	1700	1050
Lubrication	Splash	Grav. pres.	Spl. pres.	Pressure	Pressure	Spl. pres.	Spl. pres.	Pressure	Pressure	Spl. pres.	Spl. pres.
Cooling System	Gear	Centrifugal	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Centrifugal	Centrifugal	Water pump
Radiator Type	Fin. T. cast	V. tube cast	Cell. cast	Cell. cast	Cell. cast	Fin. cast	Fin. T. cast	Cell. sheet	Fin. T. cast	Fin. T. cast	Fin. T. cast
Carburetor	Stromberg	Pierce-Arrow	Stromberg	Rayfield	Stromberg	Stromberg	Schebler	Stromberg	Master	Stromberg	Schebler
Ignition, Make	Dixie, Split.	Bosch, Elae.	Bosch	Bosch	Bosch	Bosch	Bosch	Bosch	Eisemann	Eisemann	Eisemann
Type, Control	Dual, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, fixed	Single, hand	Dual, hand	Dual, hand	Single, fixed	Auto
Governor Drive	Motor	Motor	.....	Engine	Motor	.....	Motor	.....	Engine	Motor	Motor
Speed, MPH	11	14	12	10	12	11	10	12	12	15	10
Clutch Type	Cone	Cone	Dry plate	Wet disc	Wet disc	Dry plate	Cone	Cone	Dry plate	Dry disc	Dry disc
Trans. Gearset	Selective	Selective	Selective	Ind. clutch	Ind. clutch	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Unit-J., 4	Amid., 3	Amid., 4	Amid., 4	Amid., 4	Amid., 4	Amid., 4	Amid., 4	Amid., 4	Amid., 4	Amid., 3
Driven by	Double chain	Top worm	Int. gear	Top worm	Top worm	Top worm	Top worm	Double chain	Worm	Worm	Top worm
Ratio Gear Red.	10.50-1	7.80-1	12.50-1	.....	.....	5.00-1	14.00-1	5.00-1	10.25-1	13.66-1	13.67-1
Tor. Taken by	Springs	Torsion arm	Springs	Springs	Springs	Springs	Torque rod	.....	Springs	Springs	Springs
Propelled by	Radius rod	Radius rod	Springs	Radius rod	Radius rod	Springs	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	151 in.	132, 168, 204 in.	160 in.	171 in.	168 in.	174 in.	168 in.	150 in.	171 in.	180 in.	158, 170 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	38x6, 42x6d	36x5, 40x6d	36x5, 40x6d	36x6, 36x6d	36x6, 40x6d	36x5, 40x6	36x5, 40x6d	34x5, 34x4d	36x6, 40x6d	36x6, 40x6d	36x6, 40x6d
Driver's Seat	Right	Right	Left	Right	Right	Left	Left	Right	Left	Left	Left
Control Levers	Right	Right	Centre	Centre	Right	Centre	Centre	Right	Centre	Centre	Centre

LOAD CAPACITY, 10,000 POUNDS.

Make	Sterling	Taylor	Titan	Transport T.	Tracktor	U. S.	Walter	Watson	White
Model	.....	.....	RW	T	A	K	F	.....	T C D
Capacity	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Chassis Price	\$5000	\$4600	\$4550	\$2750	\$1750	\$4550	\$5000	.....	\$5000
S. A. E. Rating	40.00	44.20	33.80	22.50	22.50	36.10	36.10	32.40	28.90
Engine Cyls.	Four	Four	Six	Four	Four	Four	Four	Four	Four
How Cast	Pairs	Pairs	Threes	Block	Block	Pairs	Block	Pairs	Block
Horse Stroke	4 1/2 x 6 1/2	5 1/2 x 5 1/2	3 1/2 x 5 1/2	3 1/2 x 5	3 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2	4 1/2 x 5 1/2
Valve Location	Left	.....	Right	Right	.....	Left	Right	Left	Right
No. Main Bear.	Three	Three	Three	Three	Three	Three	Three	Three	Three
Max. RPM	950	1166	1000	.....	1500	950	1000	1100	.....
Lubrication	Clr. spl.	Pressure	Spl. pres.	Pressure	Spl. pres.	Clr. spl.	Pressure	Spl. pres.	Pressure
Cooling System	Centrifugal	Cent. pump	Cent. pump	Thermo	Cent. pump	Centrifugal	Cent. pump	Centrifugal	Cent. pump
Radiator Type	Fin. cast	Fin. cast	Fin. sheet	Cell. sheet	Cell. cast	Cell. sheet	Fin. cast	Cellular	Cell. sheet
Carburetor	Zenith	Zenith	Schebler	Zenith	Schebler	Stromberg	H. N.	Zenith	White
Ignition, Make	Eisemann	Eisemann	Bosch	Bosch	Dixie	Bosch	Eisemann	Bosch	H. T. M.
Type, Control	Dual, manual	Dual	Single, hand	Single, manual	Single, hand	Dual, hand	Single, auto	Hand	Single, hand
Governor Drive	Motor	Gear set	Engine	Motor	.....	Motor	Engine	Motor	.....
Speed, MPH	13, 15	14	10	.....	.....	10, 13	14	11 1/2	.....
Clutch Type	Wet disc	Dry plate	Dry plate	Dry plate	Dry disc	Cone	Dry plate	Wet disc	Wet plate
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Ind. C.	Selective	Selective	Selective
Located Speeds	Amid., 3	Amid., 4	Amid., 3	Unit-M., 4	Unit-M., 3	Amid., 4	Amid., 4	Amid., 4	Amid., 4
Driven by	Top worm	Worm	Top worm	Worm	Int. gear	Top worm	Int. gear	Top worm	Double chain
Ratio Gear Red.	8.75-1	10.20-1	12.00-1	.....	13.40-1	11.75, 9.75-1	.....	11.66-1	.....
Tor. Taken by	Springs	Springs	Springs	Springs	Torque rod	Springs	Springs	Springs	Radius rod
Propelled by	Radius rod	Radius rod	Radius rod	Radius rod	Torque rod	Radius rod	Springs	Radius rod	Radius rod
Springs, For	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Springs, Rear	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic
Wheelbase	168 in.	160 in.	158 in.	80 in.	93 in.	156, 168, 186 in.	144 in.	80 in.	169 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x6, 40x6d	36x6, 40x14	36x6, 40x6d	36x6 1/2, 34x4d	36x6, 36x4	36x6, 40x6d	36x6, 40x6d	36x6, 40x6d	36x6, 40x6d
Driver's Seat	Left	Left	Left	Left	Left	Left	Left	Left	Left
Control Levers	Left	Left	Left	Left	Left	Left	Left	Left	Left

LOAD CAPACITY, 10,000, 11,000 AND 12,000 POUNDS.

Make	Winther	Wielbita	Wilcoxtrux	Wilson	Wisconsin	Maccarr	Mack	Barber Tractor	Doane	Garford	Kelly Spring	Master
Model	108	Q	W	H	E	U	AU	S	1918	60	K 60	T
Capacity	10,000	10,000	10,000	10,000	10,000	11,000	11,000	12,000	12,000	12,000	12,000	12,000
Chassis Price	\$5000	\$4300	\$4300	\$4800	\$5000	\$4500	\$4750	\$2500	\$5300	\$4900	\$4750	\$2250
S. A. E. Rating	36.10	32.40	36.15	32.40	36.15	36.00	40.00	38.90	36.15	41.50	32.40	28.90
Engine Cyls.	Four	Four	Four	Four	Pairs	Pairs	Pairs	Four	Four	Four	Four	Four
How Cast	Pairs	Pairs	Pairs	Pairs	4x5 1/2	5.1x5 1/2	5x6	Block	Pairs	Pairs	Pairs	Block
Bore, Stroke	4x5 1/2	4x5 1/2	4x5 1/2	4x5 1/2	4x5 1/2	4x5 1/2	4x5 1/2	4x5 1/2	4x5 1/2	5.1x5 1/2	4x5 1/2	4x5 1/2
Valve Location	T head	Left	Left	Left	Left	Left	Right	4x5 1/2	Opposite	Opposite	Opposite	4x5 1/2
No. Main Bear.	Three	Three	Three	Three	Three	Three	Three	.....	Three	Three	Three	.....
Max. RPM	1100	1200	1000	1100	1300	1000	1000	.....	1000	1000	1150	1200
Lubrication	Pressure	Pump splash	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Spl. pres.	Pressure	Clr. spl.	Pressure	Pressure	Pressure
Cooling System	Cent. pump	Centrifugal	Cent. pump	Cent. pump	Cent. pump	Centrifugal	Cent. pump	Centrifugal	Centrifugal	Centrifugal	Centrifugal	Cent. pump
Radiator Type	Fin. T. cast	Cellular	Fin. T. cast	Fin. T. cast	Cell. cast	Fin. cast	Ring cast	Sq. T. Sh. case	Fin. cast	Cell. cast	Cell. cast	Honey. cast
Carburetor	Master	Stromberg	Optional	Marvel	Master	Stromberg	Stromberg	Stromberg	Holley	Rayfield	Rayfield	Master
Ignition, Make	Elsemann	Bosch	Bosch	Elsemann	Elsemann	Bosch	Spiltdorf	Bosch	Bosch	Bosch	Elsemann	Elsemann
Type, Control	Single, hand	Single, hand	Single, hand	Single, fixed	Single, hand	Single	Motor	Dual, auto	Dual, auto	Single, hand	Single, auto	Single, hand
Governor Drive	.....	Engine	Engine	Motor	Engine	Motor	.....	.....	Motor	Motor	Motor	.....
Speed, MPH	12	10	14	12	12	12	14.17	.....	10	Nine	.....	18
Clutch Type	Dry disc	Cone	Cone	Dry disc	Dry plate	Dry disc	Dry plate	Dry plate	Dry disc	Conc	Conc	Dry disc
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Amid., 4	Amid., 4	Amid., 4	Amid., 4	Unit-M., 3	Amid., 4	Amid., 3	Three	Unit-M., 3	Unit-J., 3	Unit-J., 3	Unit-M., 3
Driven by	Int. gear	Top worm	Top worm	Top worm	Top worm	Top worm	Double chain	Top worm	Double chain	Double chain	Double chain	Int. gear
Ratio Gear Red.	12.50-1	13.00-1	8.75-1	10.25-1	11.75-1	10.25-1	8.40-1	8.40-1	10.50-1	13.31-1	12.40-1	8.00-1
Tor. Taken by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Propelled by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring, For	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring, Rear	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wheelbase	162 in.	165	162 in.	160 in.	160 in.	186 in.	180 in.	84 in.	178 in.	128 in.	150 in.	110 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x5, 40x6d, 42x6d	38x6d	38x5, 40x6d	36x6, 40x6d	36x6, 40x6d	36x5, 40x6d	36x6, 40x6d	34x3 1/2, 34x7	36x6, 40x6d	36x6, 40x7d	36x7, 40x7d	34x4, 36x4d
Driver's Seat	Right	Right	Left	Left	Left	Left	Left	Left	Right	Right	Left	.....
Control Levers	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre

LOAD CAPACITY, 12,000 AND 14,000 POUNDS.

Make	Old Reliable	Packard	Peerless	Royal	Timb	Winther	Harvey	Hurlburt	Mack	Old Reliable	Royal	Sterling
Model	6E	6E	T C 6	A 6	SW	128	H T	7	AC	.....	A 7	.....
Capacity	12,000	12,000, 13,000	12,000	12,000	12,000	12,000	14,000	14,000	14,000	.....	14,000	.....
Chassis Price	\$5150	\$4500	\$5200	\$4800	\$4650	\$5250	\$3850	\$6500	\$4250	\$5000	\$5000	\$5500
S. A. E. Rating	26.15	40.00	32.40	42.02	33.80	42.02	32.40	37.75	40.00	41.62	44.20	36.20
Engine Cyls.	Four	Four	Four	Four	Six	Four	Four	Six	Four	Four	Four	Four
How Cast	Block	Block	Pairs	Pairs	Three	Pairs	Block	Block	Pairs	Pairs	Pairs	Pairs
Bore, Stroke	5x5 1/2	5x5 1/2	4x5 1/2	5.1x5 1/2	3 1/2 x 5 1/2	5 1/2 x 5 1/2	4 1/2 x 6	3 1/2 x 5 1/2	5x6	5.1x5 1/2	5 1/2 x 7	4 1/2 x 6 1/2
Valve Location	Left	Right	Opposite	T head	Right	5 1/2 x 6	Right	Right	Right	Opposite	T head	Left
No. Main Bear.	Three	Four	Three	Three	Three	Three	Three	Four	Three	Three	Three	Three
Max. RPM	150	1000	925	900	1000	1100	1000	1200	1000	.....	900	950
Lubrication	Clr. spl.	Pressure	Spl. pres.	Pressure	Spl. pres.	Pressure	Pressure	Spl. pres.	Pressure	.....	Pressure	Clr. spl.
Cooling System	Centrifugal	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Water pump	Cent. pump	Centrifugal	Cent. pump	Centrifugal
Radiator Type	Fin. T. cast	Cell. sheet	Fin. sheet	Cell. cast	Fin. sheet	Fin. T. cast	Fin. T. cast	Fin. tube	Ring cast	Fin. T. cast	Cell. cast	Fin. cast
Carburetor	Stromberg	Packard	Stromberg	Stromberg	Schebler	Master	Stromberg	Fletcher	Stromberg	Stromberg	Stromberg	Zenith
Ignition, Make	Bosch	Dixie, Splitt.	Remy	Bosch	Bosch	Elsemann	Elsemann	Dual	Spiltdorf	Bosch	Bosch	Elsemann
Type, Control	Single, hand	Single, hand	Dual, hand	Single, fixed	Single	Single, manual	Single, manual	Dual	.....	Single, hand	Single, fixed	Dual, manual
Governor Drive	Motor	Engine	Motor	Motor	Engine	.....	.....	Motor	Motor	Duplex	Motor	Motor
Speed, MPH	10	11	11	10	Nine	12	11	12	11.05	.....	10	12
Clutch Type	Wet disc	Dry plate	Cone	Wet disc	Dry plate	Dry disc	Dry disc	Dry disc	Dry plate	Wet disc	Wet disc	Wet disc
Trans. Gearset	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective	Selective
Located Speeds	Unit-J., 3	Amid., 4	Unit-J., 4	Amid., 3	Amid., 3	Amid., 4	Amid., 4	Amid., 4	Amid., 3	Unit-J., 3	Amid., 3	Unit-J., 3
Driven by	Double chain	Top worm	Double chain	Top worm	Top worm	Int. gear	Top worm	Worm	Double chain	Double chain	Double chain	Double chain
Ratio Gear Red.	8.93-1	10.66-1	10.50-1	.....	13.00-1	12.50-1	8.75-1	11.33-1	10.77-1	.....	.....	11.67-1
Tor. Taken by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Propelled by	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring, For	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spring, Rear	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wheelbase	126 in.	156, 166 in.	151 in.	168 in.	168 in.	162 in.	125 in.	156 in.	119 in.	150 in.	158 in.	168 in.
Tire Type	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
Tire Sizes	36x6, 40x7d	36x6, 40x7d	38x7, 42x7d	36x6, 40x6d	36x6, 40x6d	36x6, 40x12	36x6, 36x5d	36x6, 40x7d	36x5, 40x5d	36x6, 40x7d	36x7, 40x7d	36x6, 40x7d
Driver's Seat	Right	Left	Right	Right	Left	Right	Left	Left	Left	Right	Right	Left
Control Levers	Right	Left, centre	Right	Right	Centre	Centre	Centre	Centre	Centre	Right	Right	Centre

MECHANICAL SPECIFICATIONS OF 1918 GASOLINE-ENGINE WAGONS, TRUCKS AND TRACTORS.

For Manufacturers' Names, Addresses and Other Detail, See General Indices.

TRACTORS, LOAD CAPACITY TO 30,000 POUNDS.

Make	Western	Winther	Dayton	Knox	Tractor	Knox	Tractor	Mack	Tractor	Mack	Tractor	Phoenix
Model	148	148	E	35	36	35	36	AC	AC	AC	Centipede	Centipede
Capacity	14,000	14,000	15,000	20,000	20,000	20,000	20,000	22,000	22,000	30,000	.....	.....
Chassis	Price.....	Price.....	Price.....	Price.....	Price.....	Price.....	Price.....	Price.....	Price.....	Price.....	Price.....	Price.....
S. A. E. Rating	41.60	42.02	44.20	40.00	40.00	40.00	40.00	40.00	40.00	40.00	48.20	48.20
Engine Cyls.	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four	Four
How Cast	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bore, Stroke	5.1x6 1/2	5 1/4 x 6	5 1/4 x 7	5x6	5x6 1/2	5x6 1/2	5x6 1/2	5x6	5x6	5x6	5 1/2 x 7	5 1/2 x 7
Valve Location	T head	T head	T head	Right	Head	Head	Head	Right	Right	Right	Right	Right
No. Main Bear.	Three	Three	Three	Three	Three	Three	Three	Three	Three	Three	Five	Five
Max. R.P.M.	1100	1000	1000	1000	1000	1000	1000	1000	1000	1000	750	750
Lubrication	.....	Pressure	Pressure	Pressure	Pressure	Pressure	Pressure	Pressure	Pressure	Pressure	Spl. pres.	Spl. pres.
Cooling System	.....	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Cent. pump	Centrifugal	Centrifugal
Radiator Type	.....	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Fin. T. cast	Perfex	Perfex
Ignition	.....	Master	Master	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Stromberg	Kingston	Kingston
Type, Control	.....	Single, manual	Single, manual	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Single, hand	Swiss, Dixie	Swiss, Dixie
Governor Drive	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Hand	Hand
Speed, MPH	10	10	10	.....	.....	.....	.....	.....	.....	.....	Motor	Motor
Clutch Type	.....	Dry disc	Dry disc	.....	.....	.....	.....	.....	.....	.....	Five	Five
Trans. Gearset	.....	Selective	Selective	.....	.....	.....	.....	.....	.....	.....	Dry plate	Dry plate
Located	.....	Amid., 4	Amid., 3	Amid., 3	Amid., 3	Amid., 3	Amid., 3	Amid., 3	Amid., 3	Amid., 3	Selective	Selective
Driven by	.....	Int. gear	Int. gear	Double chain	Double chain	Double chain	Double chain	Double chain	Double chain	Double chain	Unit, 3	Unit, 3
Ratio	.....	12.50-1	12.00-1	12.00-1	12.00-1	12.00-1	12.00-1	11.50-1	11.50-1	14.10-1	Gears	Gears
Tor. Taken by	.....	15.00-1	15.00-1	15.00-1	15.00-1	15.00-1	15.00-1	15.00-1	15.00-1	15.00-1	.....	.....
Propelled by	.....	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	Radius rod	.....	.....
Springs, For	.....	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	Spiral	Spiral
Springs, Rear	.....	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	1/2 elliptic	162 in.	162 in.
Wheelbase	.....	146 in.	148 in.	148 in.	148 in.	148 in.	148 in.	148 in.	148 in.	148 in.	Centipede	Centipede
Tire Type	.....	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid	10 sq. ft.	10 sq. ft.
Tire Sizes	.....	36x6, 40x7d, x14	36x6, 40x7d, 42x6d	36x6, 40x7d, 42x6d	36x6, 40x7d, 42x6d	36x6, 40x7d, 42x6d	36x6, 40x7d, 42x6d	36x6, 40x7d, 42x6d	36x6, 40x7d, 42x6d	36x6, 40x7d, 42x6d	Left	Left
Driver's Seat	.....	Right	Left	Left	Left	Left	Left	Left	Left	Left	Right	Right
Control Levers	.....	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	Centre	.....	.....

All data included in these specifications has been prepared by the builders of the vehicles and the prices, carefully verified, are as of January 15.

In several instances these prices include a war tax, but practically all of them are exclusive of a war tax.

See price list for detail of types and models.

The foregoing tabulation of construction detail of American gasoline-engined wagons, trucks and tractors for 1918 is the most complete record of the industry ever compiled. It presents the specification data of 490 different vehicles, built by 173 manufacturers. Included in the information is a directory of the industry that shows that 305 concerns are engaged in it. The list of vehicles by models, capacities and prices has been prepared for quick reference. On the pages following are listed the names of the manufacturers of 13 different construction units included in practically all the machines for which specifications are given.

TRUCK CONSTRUCTION UNIT MAKERS

APPENDED is a list of manufacturers of construction units that are used in building the trucks included in the tabulation of specifications appearing on the preceding pages. So far as possible every detail has been verified to insure correctness. Where the truck manufacturers build their own units, as in some instances they do, these are not specified. The name of the manufacturer is preceded by the trade name of the product wherever this is de-

sirable to specify, and these will serve to identify the trade names under which are grouped in alphabetical order the names of the trucks, and where possible, the load capacities of the machines in which the construction units are used.

The manufacturers are grouped as producing frames, engines, radiators, magnetos, lighting systems, governors, carburetors, clutches, transmission gearsets, rear axles, springs, steering gears and universal joints.

FRAME MANUFACTURERS.

Detroit—Detroit Pressed Steel Co., Detroit, Mich.
Hydraulic—Hydraulic Pressed Steel Co., Cleveland, O.
Parish—Parish Manfg. Co., Reading, Pa.
Parish & Bingham—Parish & Bingham, Cleveland, O.
Savage—Savage Arms Co., Sharon, Pa.
Smith—A. O. Smith Co., Milwaukee, Wis.

ENGINE MANUFACTURERS.

Beaver—Beaver Manfg. Co., Milwaukee, Wis.
Buda—Buda Co., Harvey, Ill.
Continental—Continental Motors Corp., Detroit, Mich.
G. B. & S.—Golden, Belknap & Swartz, Detroit, Mich.
H. S.—Herschell-Spillman Co., North Tonawanda, N. Y.
Light—Light Manfg. & Foundry Co., Pottstown, Pa.
Lyeomg—Lyeomg Foundry & Machine Co., Williamsport, Pa.
LeRoi-Milwaukee—Milwaukee Mch. Tool Co., Milwaukee, Wis.
Rutenber—Rutenber Motor Co., Marion, Ind.
Waukesha—Waukesha Motor Co., Waukesha, Wis.
Wisconsin—Wisconsin Motor Manfg. Co., Milwaukee, Wis.

RADIATOR MANUFACTURERS.

American—American Auto Sheet Metal Wks., Springfield, Mass.
Bush—Bush Manfg. Co., Hartford, Conn.
Candler—Candler Radiator Co., Detroit, Mich.
Chicago—Chicago Manfg. Co., Chicago, Ill.
Emco—English & Mersick Co., New Haven, Conn.
Fedders—Fedders Manfg. Co., Buffalo, N. Y.
Harrison—Harrison Manfg. Co., Lockport, N. Y.
Ideal—Ideal Sheet Metal Works, Chicago, Ill.
Livingston—Livingston Radiator & Manfg. Co., New York, N. Y.
Long—Long Manfg. Co., Detroit, Mich.
McCord—McCord Manfg. Co., Detroit, Mich.
Mayo—Marlin Rockwell Corp., New Haven, Conn.
National—National Radiator Co., Chicago, Ill.
Perfex—Perfex Radiator Co., Racine, Wis.
R-T—Rome-Turney Radiator Co., Rome, N. Y.

IGNITION SYSTEM MANUFACTURERS.

Bosch—Bosch Magneto Co., New York, N. Y.
Connecticut—Connecticut Tel. & Elec. Co., Meriden, Conn.
Deleo—Dayton Engineering Laboratories Co., Dayton, O.
Auto-Lite—Electric Auto-Lite Co., Toledo, O.
Berling—Erriesson Manfg. Co., Buffalo, N. Y.
Elsemann—Elsemann Magneto Co., Brooklyn, N. Y.
A-K—Atwater Kent Manfg. Co., Philadelphia, Pa.
National—National Coil Co., Lansing, Mich.
Remy—Remy Electric Co., Detroit, Mich.
Simms—Simms Magneto Co., East Orange, N. J.
Dixie-Splittdorf—Splittdorf Electrical Co., Newark, N. J.
Westinghouse—Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.

LIGHTING SYSTEM MANUFACTURERS.

A-C—Allis-Chalmers Manfg. Co., Milwaukee, Wis.
Bijur—Bijur Motor Lighting Co., Hoboken, N. J.
Bosch—Bosch Magneto Co., New York, N. Y.
Carleton—Carleton Co., Boston, Mass.
Deleo—Dayton Engineering Laboratories Co., Dayton, O.
Disco—Disco Electric Starter Co., Detroit, Mich.
Dyneto—Dyneto Electric Co., Syracuse, N. Y.
Entz—Dyneto Electric Co., Syracuse, N. Y.
Auto-Lite—Electric Auto-Lite Co., Toledo, O.
G. & D.—Gray & Davis, Cambridge, Mass.
Jesco—Roth Bros. & Co., Chicago, Ill.
L-N—Leece-Neville Co., Cleveland, O.
N-E—North East Electrical Co., Rochester, N. Y.
Remy—Remy Electric Co., Detroit, Mich.
Splittdorf—Splittdorf Electrical Co., Newark, N. J.
U. S. L.—United States Light & Heat Co., Niagara Falls, N. Y.
Vesta—Vesta Accumulator Co., Chicago, Ill.
Wagner—Wagner Electric Manfg. Co., St. Louis, Mo.

GOVERNOR MANUFACTURERS.

Duplex—Duplex Engine Governor Co., New York, N. Y.
Monarch—Monarch Governor Co., Detroit, Mich.
Pierce—Pierce Governor Co., Anderson, Ind.

CARBURETOR MANUFACTURERS.

Ball—Penberthy Injector Co., Detroit, Mich.
Bulek—Bulek Carburetor Co.
Carter—Carter Carburetor Co., St. Louis, Mo.
Ensign—Ensign Carburetor Co., Los Angeles, Cal.
H. & N.—H. & N. Sales Co., New York, N. Y.
Holley—Holley Bros. Co., Detroit, Mich.
Johnson—Johnson Co., Detroit, Mich.
K-D—K-D Carburetor Co., Cleveland, O.
Marvel—Marvel Carburetor Co., Flint, Mich.
Master—Master Carburetor Corp., Detroit, Mich.

Rayfield—Findelson & Kropf Manfg. Co., Chicago, Ill.
Schebler—Wheeler & Schebler, Indianapolis, Ind.
Stewart—Detroit Lubricator Co., Detroit, Mich.
Sunderman—Sunderman Safety Carburetor Co., Newburgh, N. Y.
Tillotson—Tillotson Carburetor Co., Cleveland, O.
Stromberg—Stromberg Motor Devices Co., Chicago, Ill.
Shakespeare—Shakespeare Co., Kalamazoo, Mich.
Zenith—Zenith Carburetor Co., Detroit, Mich.

CLUTCH MANUFACTURERS.

Borg & Beck—Borg & Beck Co., Moline, Ill.
Brown-Lipe—Brown-Lipe Gear Co., Syracuse, N. Y.
Cotta—Cotta Transmission Co., Rockford, Ill.
Covert—Covert Gear Co., Detroit, Mich.
Detroit—Detroit Gear & Machine Co., Detroit, Mich.
Fuller—Fuller & Sons Manfg. Co., Kalamazoo, Mich.
G. B. & S.—Golden, Belknap & Swartz, Detroit, Mich.
Grant-Lee—Grant-Lee Gear Co., Cleveland, O.
Hartford—Hartford Auto Parts Co., Hartford, Conn.
Hoosier—Hoosier Motor Co., Goshen, Ind.
Lyeomg—Lyeomg Foundry & Mch. Co., Williamsport, Pa.
Mechanics—Mechanics' Machine Co., Rockford, Ill.
M. & E.—Merchant & Evans Co., Philadelphia, Pa.
Muncie—Muncie Gear Works, Muncie, Ind.
Warner—Warner Gear Works, Terre Haute, Ind.

TRANSMISSION MANUFACTURERS.

Brown-Lipe—Brown-Lipe Gear Co., Syracuse, N. Y.
Cotta—Cotta Transmission Co., Rockford, Ill.
Covert—Covert Gear Co., Detroit, Mich.
Detroit—Detroit Gear & Machine Co., Detroit, Mich.
Fuller—Fuller & Sons Manfg. Co., Kalamazoo, Mich.
Grant-Lee—Grant-Lee Gear Co., Cleveland, O.
Hartford—Hartford Auto Parts Co., Hartford, Conn.
Meehanes—Mechanics' Machine Co., Rockford, Ill.
Muncie—Muncie Gear Works, Muncie, Ind.
Brownell—Rochester Motors Co., Rochester, N. Y.
Warner—Warner Gear Co., Muncie, Ind.
T. W. Warner—T. W. Warner Co., Muncie, Ind.

REAR AXLE MANUFACTURERS.

Clark-Celfor—Clark Equipment Co., Buchanan, Mich.
Empire—Empire Axle Co., Dunkirk, N. Y.
Gemco—Gemco Manfg. Co., Milwaukee, Wis.
Hess—Hess Spring & Axle Co., Cincinnati, O.
K-H—Keystone-Hindley Gear Co., Philadelphia, Pa.
Russel—Russel Motor Axle Co., North Detroit, Mich.
Salisbury—Salisbury Wheel & Manfg. Co., Jamestown, N. Y.
Peru—Peru Auto Parts Manfg. Co., Peru, Ind.
Sheldon—Sheldon Axle & Spring Co., Wilkesbarre, Pa.
Timken—Timken Axle Co., Detroit, Mich.
Torbensen—Torbensen Axle Co., Cleveland, O.
W-W—Walker-Weiss Axle Works, Flint, Mich.
W-M—Weston-Mott Co., Flint, Mich.
Wisconsin—E. B. Hayes Corp., Oshkosh, Wis.

SPRING MANUFACTURERS.

Champ—Champ Spring Co., St. Louis, Mo.
Detroit—Detroit Steel Products Co., Detroit, Mich.
G-C—Garden City Spring Works, Chicago, Ill.
Hess—Hess Spring & Axle Co., Cincinnati, O.
Higgins—Higgins Spring & Axle Co., Racine, Wis.
Iron City—Iron City Spring Co., Pittsburgh, Pa.
Kalamazoo—Kalamazoo Spring & Axle Co., Kalamazoo, Mich.
Liggett—Liggett Spring & Axle Co., Monongahela, Pa.
Mather—Mather Spring Co., Toledo, O.
Merrill—E. B. Merrill Spring Co., New York, N. Y.
National—National Spring Co., New Castle, Ind.
Penn—Penn Spring Works, Baldwinville, N. Y.
Perfection—Perfection Spring Co., Cleveland, O.
Rowland—Wm. & Harvey Rowland, Inc., Frankford, Phila., Pa.
Sheldon—Sheldon Axle & Spring Co., Wilkesbarre, Pa.
Standard—Standard Steel Spring Co., Coraopolis, Pa.
Tutthill—Tutthill Spring Co., Chicago, Ill.
W-M—Weston-Mott Co., Flint, Mich.

STEERING GEAR MANUFACTURERS.

Barnes—Barnes Gear Co., Oswego, N. Y.
CAS—CAS Products Co., Columbus, O.
Ditt Weller—Ditt Weller Manfg. Co., Gallon, O.
Gemmer—Gemmer Manfg. Co., Detroit, Mich.
Hayes—E. B. Hayes Corp., Oshkosh, Wis.
Jacox—Jackson-Church-Wilcox Co., Saginaw, Mich.
Lavine—Lavine Gear Co., Racine, Wis.
Ross—Ross Gear & Tool Co., Lafayette, Ind.
Warner—Warner Gear Co., Muncie, Ind.

UNIVERSAL JOINT MANUFACTURERS.

Acme—Acme Universal Joint Manfg. Co., Kalamazoo, Mich.
Arvac—Arvac Manfg. Co., Anderson, Ind.
Blood—Blood Bros. Machine Co., Allegan, Mich.

Hartford—Hartford Auto Parts Co., Hartford, Conn.
K-B—Kinsler-Bennett Co., Hartford, Conn.
M. & E.—Merchant & Evans, Philadelphia, Pa.
Frank—Smith-Serrell Co., Inc., New York, N. Y.
Spicer—Spicer Manfg. Co., South Plainfield, N. J.

FRAME MANUFACTURERS.

Detroit Pressed Steel Co.
 American.
 Commerce, model E.
 Niles.
 Noble.
 Republic, $\frac{3}{4}$, models 10 and 11.
Savage Arms Co.
 Bessemer, all models.
Collier.
 Dart, all models.
 D-E, all models.
 Republic, models A and T.
Parish & Bingham.
 Beck, all models.
 Gary, models F, G, H and HU.
 I. H. C., all models.
 Lippard-Stewart, all models.
 Muskegon.
 Palmer, all models.
 Rainier.
 Selden, all models.
A. O. Smith.
 Armleder, model HW.
 Nash, all models.
 Sterling, all models.
 Wilcox, all models.
 Wisconsin, all models.
Parish.
 Atlas.
 Beech Creek.
 Bourne, all models.
 Brockway, all models.
 F-W-D.
 Hahn, all models.
 Larrabee-Deyo, all models.
 Maccar, all models.
 Netco.
 Riker, all models.
 Sanford, all models.
 Signal, all models.
 Vlm.
Hydraulic.
 Maxwell.

ENGINE MANUFACTURERS.

Waukesha.
 Acason, all models.
 Beech Creek.
 Blair, all models.
 Burford, model D3.
 Chase, models A and C.
 Fageol.
 Gramm-Bernstein, all models.
 Hendrickson, all models.
 Indiana, models T, E and L.
 Lapeer, all models.
 Moreland, four and five-ton.
 Sterling, all models.
 Triangle.
 United States, model K.
 Wichita, models R, O and Q.
 Wilcox, model W.
 Wisconsin, all models.
Continental.
 Acme, all models.
 American.
 Armleder, all models.
 Atterbury, all models.
 Available, all models.
 Beck, all models.
 Bessemer, all models.
 Brinton.
 Brockway, all models.
 Chase, model O.
 Clydesdale, all models.
 Corbitt, all models.
 D-E, models A and B.
 DeKalb, all models.
 Denby, all models.
 Diamond T, all models.
 Forschler, all models.
 Globe.
 G-M-C, all models.
 Hahn, all models.
 Harrison, all models.
 Hall, all models.
 Hoover.
 Horner, all models.
 Independent, all models.
 King.
 Kleiber, all models.
 Lane, all models.
 Lange, all models.

Larrabee-Deyo, all models.
 Lippard-Stewart, models W, HW, F and G.
 Little Giant, models 7A and 16.
 Maccar, all models.
 Menominee, all models.
 Modern.
 Moreland, 1, $1\frac{1}{2}$ and $2\frac{1}{2}$ tons.
 Muskegon.
 Nelson & Le Moon, $1\frac{1}{2}$, 2 and 3 tons.
 Netco.
 Niles, all models.
 Noble.
 Onelda, all models.
 Palmer, all models.
 Republic, models 10 and 11.
 Sandow, all models.
 Sanford, models W15 and W25.
 Schleicher, all models.
 Selden, all models.
 Signal, all models.
 Standard, all models.
 Steele, model C.
 Hercules, all models.
 Stewart, model 9.
 Taylor.
 Tiffin, all models.
 United States, models F, H, D and J.
 United, models BSW, CSW and DSW.
 Velle, all models.
 Watson Tractor.
 White-Hickory.
 Wilcox, model S.
 Wilson, 2 and $3\frac{1}{2}$ tons.
 Witt-Will, all models.
Buda.
 Barber Tractor.
 Burford, model O3.
 Chase, models B and X.
 Columbia.
 Commerce, model E.
 Concord, all models.
 Dart, all models.
 D-E, model C.
 Duplex.
 Gabriel.
 Garford, models 75D, 66B and 70B.
 Garford Tractor.
 Gary, all models.
 Gersix.
 Schacht, all models.
 Harvey, all models.
 Hawkeye.
 Hudson.
 Hurlburt, all models.
 Little Giant, model H.
 Master, model M and $3\frac{1}{2}$ ton.
 Nash, model 4017.
 National.
 Nelson & Le Moon, 5 ton.
 Pan-American.
 Pull-More.
 Rennoc-Leslie, all models.
 Republic, models A, T and V.
 Rock Falls.
 Sanford, model W35.
 Selden.
 Service, all models.
 Stewart, model 7.
 Sullivan, all models.
 Taylor.
 Thomas, all models.
 Titan.
 United.
 Universal, models G and L.
Lycoming.
 Atlas.
 Collier.
 Ellsworth.
 Old Hickory.
Wisconsin.
 Brinton, model H.
 Couple-Gear, all models.
 Croce.
 Dayton, all models.
 Dispatch.
 F-W-D.
 Garford, models 77B, 68, 69, $7\frac{1}{2}$ and 10 ton.
 Gersix.
 Highway Tractor.
 Higrade.
 Lamson, all models.
 Lippard-Stewart, model MW.
 Old Reliable, all models.

Royal, all models.
 Union.
 United, model ESW.
 Western.
 Winther, all models.
Light.
 Rainier.
Golden, Belknap & Schwartz.
 Bethlehem, model A1.
 Gem.
 Lawson.
 Reya.
LeRoi-Milwaukee.
 D-E, model A.
 Stewart, model 6.
 Selden, model G.
Herschell-Spillman.
 Bourne, all models.
 Grant, model 12.
 Hercules, 5 and 7 tons.
Beaver.
 Indiana, model D.
 Lambert.
 Superior, all models.
 United FWD.

RADIATORS.

Bush.
 A and B, all models.
 Brockway, all models.
 Chase, all models.
 Concord, all models.
 D-E, all models.
 DeKalb, all models.
 Kearns.
 Larrabee-Deyo, all models.
 Maccar, all models.
 Rainier.
 Selden, all models.
 Hercules, all models.
 Stewart, all models.
 Sullivan, all models.
 Tiffin, all models.
 United States, models E, H and K.
Long.
 Acme, all models.
 American.
 Armleder, all models.
 Columbia.
 Commerce, model E.
 Denby.
 Duplex.
 Federal.
 F-W-D.
 Gramm-Bernstein.
 Hall, all models.
 Hurlburt.
 Indiana, all models.
 I. H. C.
 Kelly-Springfield.
 Menominee, models EW, FW and H.
 Modern.
 Onelda, all models.
 Peerless.
 Service, all models.
 Standard, all models.
 Sterling, all models.
 Taylor, all models.
 Universal, all models.
 United States.
 Velle.
 Wilson, all models.
Chicago.
 Available, all models.
 Gary, models F, G and H.
 Harvey, all models.
 Hendrickson, all models.
 Nelson & Le Moon, all models.
 Pan-American.
 United FWD.
 Wisconsin, all models.
Ideal.
 Beck, all models.
 Bessemer, all models.
 Blair, all models.
 Corbitt, models E and D.
Fedder.
 Bethlehem, all models.
 Knox, all models.
 Lang, all models.
 Lippard-Stewart, models W, HW, F and G.
 Palmer, all models.
 United States, models D and J.

Watson Tractor.
G. & O.
 Bourne, all models.
Harrison.
 Briscoe, model 24.
Sparks-Withington.
 Briscoe, model T24.
Rome-Turney.
 Corbitt, models C, B, A and AA.
 Menominee, models D and G.
 Netco.
 Union.
American.
 Dispatch.
Candler.
 Ellsworth.
 Hoover.
 Lapeer.
 Old Hickory.
Perfex.
 Fageol.
 Gary, models H, U and K.
 Gersix.
 Kleiber, all models.
 Titan.
 Wichita, models K, L and R.
 Wilcox, all models.
English & Mersick.
 Forschler, all models.
 Wichita, models A, B, O and Q.
McCord.
 G. M. C., all models.
 I. H. C., all models.
 Nash, all models.
 Sanford, all models.
 Signal, all models.
 Studebaker, all models.
 Vim.
Livingston.
 King.
Mayo.
 Lippard-Stewart, model MW.
Kuss.
 Reya.
Bremer.
 Sandow, models A and B.
 Winther, all models.
National.
 Witt-Will, all models.
IGNITION MANUFACTURERS.
Atwater Kent.
 Maxwell.
 Packett.
 Steele.
Berling.
 Bethlehem, all models.
 D-E, all models.
 Stewart, all models.
Bosch.
 A. and B., all models.
 Autocar.
 Available.
 Barber Tractor.
 Beck, all models.
 Brinton.
 Brockway, models J3 and K3.
 Chase, all models.
 Clydesdale, all models.
 Continental, all models.
 Dayton, all models.
 Diamond T, all models.
 Doane, all models.
 Dorris.
 Forschler, all models.
 Garford, models 70B, 77B, 68, 69, all tractors.
 Schacht, all models.
 Hahn, 1½ tons.
 Hall, 2, 3½ and 5 tons.
 Harrison, all models.
 Horner, all models.
 I. H. C., models F and G.
 Indiana, models D, R and L.
 King.
 Kleiber, all models.
 Lamson, all models.
 Lang, all models.
 Larrabee-Deyo, all models.
 Maccar, all models.
 Nelson & LeMoon, all models.
 New York, all models.
 Old Reliable, all models.
 Onelda, all models.
 Palmer, all models.
 Pan-American.
 Republic, models 10, 11, A. T and V.
 Riker, all models.
 Rowe, all models.
 Royal, all models.
 Sandow, all models.

Sanford, all models.
 Schleicher, all models.
 Sheldon, models TXL, B and BR.
 Sullivan.
 Tiffin, all models.
 Transport Tractor.
 United States, all models.
 United Tractor.
 Velle, all models.
 Watson Tractor.
 Ware.
 Western.
 Wilcox, all models.
Eisemann.
 Acason, all models.
 Acme, all models.
 American.
 Armleder, all models.
 Atterbury, all models.
 Blair, all models.
 Bourne, all models.
 Burford, all models.
 Columbia.
 Concord, all models.
 Corbitt, all models.
 Couple-Gear, all models.
 Dart, all models.
 DeKalb, all models.
 Denby, all models.
 Duplex.
 Fageol.
 Federal, all models.
 F-W-D.
 Gary, all models.
 Globe.
 G-M-C, all models.
 Gramm-Bernstein, all models.
 Hahn, ½ ton.
 Harvey, all models.
 Highway Tractor.
 Independent, all models.
 Indiana, model T.
 Kelly-Springfield, all models.
 Kissel, all models.
 Knox, all models.
 Koehler, all models.
 Lippard-Stewart, all models.
 Little Giant, all models.
 Manly, all models.
 Master, all models.
 Menominee, all models.
 Muskegon.
 Nash, model 4017.
 Netco.
 Niles, all models.
 Noble.
 Pierce-Arrow, all models.
 Republic, ¾ ton.
 Sandow, model A.
 Selden, model G, C and D.
 Service, all models.
 Signal, all models.
 Standard, all models.
 Sterling, all models.
 Superior, all models.
 Taylor, all models.
 Triangle.
 Union.
 United FWD.
 United, all models.
 Universal, all models.
 Walter.
 White, all models.
 Wichita, all models.
 Wilson, all models.
 Winther, all models.
 Wisconsin, all models.
 Witt-Will, all models.
Spiltdorf.
 Bessemer, all models.
 Corliss, model A.
 Grant, all models.
 Fulton.
 Garford, models 75B and 66B.
 Lapeer, all models.
 Mack, all models.
 Rainier.
 Rennoc-Leslie, all models.
Dixie.
 Fargo.
 Hendrickson.
 Hoover.
 Hurlburt, all models.
 I. H. C., model H.
 Lawson.
 Moreland, all models.
 Packard, all models.
 Hercules, all models.
 Vim.
Connecticut.

Briscoe, all models.
 Collier.
 Gem.
 Kearns.
 Lane, all models.
 Old Hickory.
 Rush.
Simms.
 Higrade.
 Thomas.
Deico.
 Buick.
 Nash, model 2017.
Remy.
 Commerce.
 Lambert.
 Peerless, all models.
 Reo, model F.
 Republic, ¾ ton.
 Studebaker.
Westinghouse.
 Gersix.
National.
 Reo, model J.
LIGHTING MANUFACTURERS.
Gray & Davis.
 Acme, all models.
 Peerless, all models.
Remy.
 Atlas.
 Commerce.
 Lawson.
 Reo, all models.
 Republic, ¾ ton.
 Sanford, model W15.
 Velle, model 25A.
Vesta.
 Beck.
 Columbia.
 Gary, all models.
 G-M-C, model 101A.
 Horner, all models.
 Hurlburt, all models.
 Lambert.
 Lamson, 1½, 2½ and 3½ tons.
 Sterling, 3½, 5 and 7 tons.
 Western.
Ents.
 Bourne Magnetic, all models.
Auto-Lite.
 Briscoe, all models.
 Overland, all models.
 Maxwell.
Deleo.
 Brockway, model R.
 Maxfer.
Westinghouse.
 Concord, all models.
 Fargo.
 Federal models T, U and W.
 Garford, all models.
 Gersix.
 Gramm-Bernstein, 2½, 3½ and 5 tons.
 Harvey, all models.
 Moreland, all models.
 Nelson & Le Moon, all models.
 Rennoc-Leslie, all models.
 Riker, all models.
 Service, all models.
 Hercules, all models.
 Stewart model 9.
 Walter.
 Wilcox.
Disco.
 Corbitt, models E and D.
Atlas-Chalmers.
 D-E, model J.
 Selden, model G.
Rijur.
 Denby, all models.
 Grant, model 12.
 Knox, all models.
 National, all models.
 Packard, all models.
 Rainier, all models.
 Thomas, all models.
 United FWD.
 Winther, all models.
 U. S. L.
 Dispatch.
North East.
 F-W-D.
 I-H-C, all models.
 Selden, models TXL, B, BR, C and D;
Dyneto.
 Gem.
 Kearns.
 Lippard-Stewart, models W, HW, F and G.
 Old Hickory.
 Reya.

Bosch.
Transport Tractor.
United States, all models.
Ware.
Lecce-Neville.
Higrade.
R. & M.
Kelly-Springfield, all models.
Roth.
Independent, model F.
Lane, all models.
Spittdorf.
Grant, model 10.
Rush.
Vim.
Carleton.
Steele, all models.
Wagner.
Studebaker, all models.

GOVERNOR MANUFACTURERS.

Pierce.
Acme, all models.
American.
Armleder, all models.
Atterbury, all models.
Available, 5 ton.
Autocar.
C. L. Barker.
Beck, all models.
Bessemer, all models.
Bethlehem, all models.
Brinton.
Columbia.
Commerce.
Concord, model A.
Corbitt, all models.
Croce.
D-E.
DeKalb, all models.
Denby.
Diamond T, model 32.
Dorris.
F-W-D.
Forschler.
Globe.
Grant, model 10.
Hall.
Horner.
Hercules.
Hahn, $\frac{3}{4}$ and $1\frac{1}{2}$ ton.
Houghton.
Hurlburt.
Indiana, model D.
Kimball.
King.
Kissel, all models.
Kleiber, all models.
Lambert.
Lane, all models.
Lang, all models.
Larrabee-Deyo, all models.
Lippard-Stewart, models W, HW, F and G.
Little Giant.
Maccar, models L, H and M.
Master.
Menard.
Menominee.
Moreland, $1\frac{1}{2}$ and $2\frac{1}{2}$ tons.
Muskegon.
New York, all models.
Niles, all models.
Noble.
Onelda.
Palmer, all models.
Pull-More.
Rennoc-Leslie, all models.
Rowe.
Sanford, all models.
Selden, models TXL, B, BR, C and D.
Standard, all models.
Stewart, model 7.
Studebaker, model 7.
Taylor, all models.
Thomas, all models.
Tiffin, models AW, GW, MC, MW, PW, RW, SW.
United.
United States, models EH, D and J.
Velle, models 25A and 26A.
Watson Tractor.
Ware.
White.
White-Hickory.
Wilcox, models S, X, Q and P.
Wilson, all models.
Witt-Will.
Monarch.
Brockway, all models.
Chase, all models.
Columbia.

Denby, all models.
Diamond T, models L and R.
Fargo.
Forschler, all models.
Fulton.
Garford, models 75B, 66B, 70B and $4\frac{1}{2}$ ton tractor.
Gary, model F.
Gersix.
G-M-C, all models.
Hall, all models.
Hercules, all models.
Horner, all models.
Independent, all models.
Koehler Tractor.
Master, model M.
Nelson & LeMoon, all models.
Pan-American.
Royal, all models.
Sandow, model B.
Signal, all models.
Superior, all models.
Transport Tractor.
United, models BSW, CSW and DSW.
Universal, all models.
Duplex.
Gary, model K.
Harvey, all models.
Hawkeye.
Nash, model 4017.
Old Reliable, model 2, 3, 4, 5 and 7 ton.
Onelda, all models.
Republic, model V.
Service, models 230, 240, 270, 275 and 300.
United FWD.
Winther, all models.
Simplex.
Bourne, all models.
Dart, models C, C4 and L.
Federal, models S, T and X.
Gary, models G, H and HU.
Higrade.
Lamson, all models.
Nash, model 2017.
Titan.
Union.
Western.

CARBURETOR MANUFACTURERS.

Schebler.
A. & B., all models.
Acason, models H, L and Tractor.
Armleder, all models.
Bethlehem, all models.
Brockway, all models.
Corliss.
D-E, model J.
Duplex.
Schacht, all models.
Geneva.
Harrison.
Highway Tractor.
Hoover.
King.
Lambert.
Larrabee-Deyo, all models.
Lawson.
Little Giant, all models.
Reya.
Selden, model G.
Standard, all models.
Studebaker, all models.
Tiffin, all models.
Union.
Stromberg.
Acason, models B, M and Tractor.
American.
Autocar.
Available, all models.
Barber Tractor.
Beck, all models.
Chase, all models.
Continental, all models.
Corbitt, all models.
Couple-Gear, all models.
Dayton, all models.
Dorris.
Federal, model W.
F-W-D.
Gary, all models.
Hahn, $\frac{3}{4}$ and $1\frac{1}{2}$ tons.
Harvey, all models.
Henderson, all models.
Indiana, all models.
Kissel, all models.
Koehler, all models.
Lamson, all models.
Lane, all models.
Lang, all models.
Maccar, models L, H and M.
Mack, all models.
Manley, model 30.
Menominee, all models.
Nash, all models.
Nelson & LeMoon, all models.
New York, all models.
Niles, all models.
Noble.
Old Reliable, all models.
Onelda, all models.
Palmer, all models.
Pan-American.
Peerless, models 2, 3, 5 and 6 tons.
Rennoc-Leslie, all models.
Republic, models 10, 11, A and T.
Sandow, all models.
Sanford, all models.
Schleicher, all models.
Selden, all models.
Service, models 220 and 230.
Signal, all models.
Steele, all models.
Superior, all models.
Thomas, all models.
Triangle.
United States, all models.
United, models BSW, CSW and DSW.
Velle, all models.
Ware.
Western.
White-Hickory.
Wichita, all models.
Wilcox, all models.
Rayfield.
Acme, all models.
Bessemer, models D, J and E.
Garford, all models.
Kelly-Springfield, all models.
Hercules, all models.
Zenith.
Concord, all models.
Armleder, models HW and KW.
Atterbury, 7R, 7C and 7D.
Bessemer, model G.
Blair, model D.
Bourne, all models.
Burford, models O3 and B3.
Clydesdale, models 65 and 120.
Collier.
Commerce, model E.
Croce.
Day-Elder, models A and C.
Denby, models 12 and 15.
Diamond T, model J3.
Fargo.
Fageol.
Federal, models S and X.
Forschler, models AO and BO.
Gramm-Bernstein, 1 and $2\frac{1}{2}$ tons.
Kelly-Springfield, model K36.
Hall, 5 tons.
Lippard-Stewart, models MW, W, HW, G.
Lincoln.
Manley, models 30 and 60.
Netco.
Jumbo.
Modern.
Pierce-Arrow, 2 and 5 tons.
Rainier.
Republic, $\frac{3}{4}$ ton.
Sterling, $2\frac{1}{2}$ and 7 tons.
Stewart, all models.
Standard Tractor.
Transport Tractor.
United States, model D.
United, models BSW and ESW.
Vim, model 21.
Watson Tractortruck.
Wichita, models B and Q.
Carter.
Atlas.
Grant, model 12.
Ellsworth.
Gem.
Kearns.
Old Hickory.
Packet.
Rush.
King.
Beech Creek.
Master.
Dart, all models.
De Kalb, all models.
Globe.
Hawkeye.
Horner, all models.
Master.
Moreland, all models.
Royal, all models.
Service, all models.
Winther, all models.

Holley.
Doane, all models.
Ford.
I-H-C, models H and F.
Sullivan, all models.
K-D.
Maxwell.
Baick.
Briscoe, all models.
Marvel.
Bulck.
G-M-C, all models.
Independent, all models.
Republic, $\frac{3}{4}$ ton.
Wilson, all models.
Stewart.
Grant, model 10.
Lapeer, all models.
Muskegon.
Sunderman.
Fulton.
Ensign.
I-H-C, model G.
Tillotson.
Overland.
Ball.
Rlker, all models.
Johanson.
Reo, all models.
Shakespeare.
Hurlburt, all models.
Columbia.
H. & N.
Walter.

CLUTCH MANUFACTURERS.

Berg & Beck.
Acason, models B, M and Tractor.
Acme, all models.
Armleder, models HW and 18.
Beech Creek.
Dayton, model H.
D-E, models A, B and C.
Grant, model 12.
Fageol.
Fargo.
Federal, all models.
Gersix.
Globe.
Hall, 2 and $3\frac{1}{2}$ tons.
Harvey, all models.
Hawkeye.
Hendrickson, model H.
Highway Tractor.
Higrade.
Indiana, all models.
Kissel, 2 ton.
Menominee, models D and G.
Nash, all models.
Niles, model E.
Noble.
Pull-More.
Rainier.
Republic, model V.
Rush.
Sanford, models W25 and W35.
Service, models 230, 240, 270, 275 and 300.
Standard, all models.
Taylor, all models.
Tiffin, models RW and SW.
Titan.
United States, model K.
Golden, Belknap & Swartz.
Bethlehem, model A1.
Gem.
Merchant & Evans.
Corblitt, models A and AA.
Dayton, models H, K, M and E.
F-W-D.
Kleiber, all models.
Lang, all models.
Onelda, all models.
Steele, all models.
Sterling, all models.
United FWD.
Detlaf.
American.
Savage Arms Co.
Old Reliable, 7 ton.
Muncie.
Acason, models H, L and Tractor.
Dart, model C-C4.
Larrabee-Deyo, model R.
Republic, model T.
United Tractor.
Hartford.
Bessemer, models D, J and E.
Brockway, models J3 and K2.
Columbia.
Schacht, all models.
Lippard-Stewart, models W, HW, F and G

Sullivan, model F.
Tiffin, models MC, MW and PW.
United States, models E, H, D and J.
Wichita, models O and Q.
Wilson, 2 ton.
Warner.
Burford, model O3.
Concord, all models.
Dart, model L.
Gary, model K.
Kissel, $\frac{3}{4}$, 2, and $3\frac{1}{2}$ ton.
Rennoc-Leslie, all models.
Tiffin, model GW.
Western.
Mechanical.
Collier.
Ellsworth.
Kearns.
Stewart, model 6.
Grant-Lees.
Lawson.
Fuller.
Acason.
Available.
Beck, all models.
Bessemer, model G.
Brockway.
Corblitt, models D and E.
Dart, model E.
DeKalb, all models.
Diamond T.
Erle.
Forschler-Dual.
Forschler, all models.
Gary, models F, G, H and HU.
Grant.
Hendrickson, model G.
Hercules.
Hewitt-Ludlow.
Higrade.
Hoover.
Hurlburt.
Independent.
Jumbo.
Lapeer, all models.
Landshaft.
Lane.
Larrabee-Deyo, models M, N and O.
Manly.
Master, model M.
Maxfer.
Menominee.
Muskegon.
Nelson & LeMoon.
Oklahoma.
Old Reliable.
Pan-American.
Palmer, all models.
Racine.
Republic, models 10, 11 and A.
Revere.
Sandow, model A.
Service, model 220.
South Bend.
Stewart, models 9 and 7.
Sullivan.
Superior, model C.
Taylor.
Tower.
Trabold.
Triangle.
Union.
United.
Van Winkle.
Weier-Smith.
White-Hickory.
Wisconsin, all models.
Wilcox.
Brown-Lipe.
Armleder, model KW.
Atterbury, all models.
Available, all models.
Brockway, model R.
Burford, model D3.
Chase, models A, B, X and O.
Clydesdale, models 45, 65, 90 and 120.
Corblitt, models C and B.
Croce.
Diamond T, all models.
Duplex.
Garford, models 75B, 66B, 70B, 77B, 68, 69
Hahn, all models.
Hill, 5 tons.
Hercules, all models.
Horner, all models.
Hurlburt, all models.
Independent, model E.
Kleiber, model AA.
Little Glant, models 15, H and 16.
Maccar, all models.

Mack, models AB, 1, $1\frac{1}{2}$, 2, AB Tractor.
Menominee, models FW, EW and H.
Moreland, 1, 4 and 5 tons.
Nelson & LeMoon, all models.
Netco.
Old Reliable, $1\frac{1}{2}$ and 2 tons.
Sandow, model B.
Sanford, model W15.
Selden, models B, BR, C and D.
Signal, models H, J, M and R.
Sterling, $2\frac{1}{2}$ tons.
Sullivan, model E.
United, all models.
Watson Tractor.
Wilcox, model S.
Witt-Will, all models.
M. & M.
Koehler, all models.
Lycoming.
Old Hickory.
Detroit.
Bethlehem, model B1.
Clydesdale, model 25.
Commerce.
D-E, model J.
Selden, model G.
Tiffin, models A and AW.
Hoosier.
Little Glant, model H.
Covert.
Niles, model B.
Republic, $\frac{3}{4}$ ton models.
Selden, model TXL.
Superior, model A.

TRANSMISSION MANUFACTURERS.

Covert.
Acason, model B.
American.
Armleder, model HW.
Columbia.
D-E, models A, B and C.
Globe.
Hall, $3\frac{1}{2}$ ton.
Indiana, models D and R.
Kelly-Springfield, all models.
Lane, models B and C.
Little Glant, model H.
Niles, all models.
Republic, $\frac{3}{4}$ ton models.
Selden, model TXL.
Sullivan, model F.
Superior, model A.
Taylor, all models.
Tiffin, models MC, MW, PW, RW and SW.
Wichita, models A, K, L, B and R.
Wilson, all models.
Cotta.
Acason, model M and Tractor.
Acme, all models.
Blair, all models.
Corblitt, models A and AA.
Fageol.
Gersix.
Higrade.
King.
Lamson, all models.
Lang, all models.
Menominee, model G.
Noble.
Onelda, all models.
Steele, all models.
Sterling, model $3\frac{1}{2}$ ton.
Titan.
United States, all models.
United FWD.
Muncie.
Acason, models H and L and Tractor.
Dart, model C-C4.
Duplex.
Kissel, 2 ton.
Larrabee-Deyo, model R.
Manly.
Republic.
United Tractor.
Brown-Lipe.
Armleder, model KW.
Atterbury, all models.
Available, all models.
Bessemer, models D, J and E.
Brockway, all models.
Burford, model D3.
Chase, models A, B, X and O.
Clydesdale, models 45, 65, 90 and 120.
Corblitt, models C and D.
Diamond T, all models.
Garford, all truck models.
Hahn, all models.
Hall, models $3\frac{1}{2}$ and 5 ton.
Harrison.
Harvey, all models.

Hercules, all models.
 Horner, all models.
 Hurlburt.
 Independent, model F.
 Indiana, models R and L.
 Kleiber, all models.
 Lippard-Stewart, models W, HW, F and G.
 Little Giant, models 15 and H.
 Maccar, all models.
 Mack, models AB, 1 ton, 1½, 2 ton Worm and Tractor 5 ton.
 Menominee, models EW, FW, H and D.
 Moreland, 1, 4 and 5 tons.
 Nelson & LeMoon, all models.
 Netco.
 Old Reliable, models 1½, 2, 3 and 4 tons.
 Peerless, 2 ton.
 Sandow, model B.
 Sanford, model W15.
 Selden, models B, BR, C and D.
 Service, models 230, 240, 270, 275 and 300.
 Signal, all models.
 Standard, all models.
 Sullivan, model E.
 United, all models.
 Velle.
 Watson Tractor.
 Wichita, models O and Q.
 Wilcox, model S.
 Witt-Will, all models.
D. S. O. C.
 Old Reliable, 2½ ton.
Grant-Lees.
 Grant, model 12.
 Fargo.
 Gem.
 Hawkeye.
 Iawson.
 Old Hickory.
 Rainier.
Brownell.
 Harrison, model C.
Mechanical.
 Kearns.
 Stewart, model 6.
T. W. Warner.
 G-M-C, all models.
 Chevrolet.
M. & M.
 Koehler, all models.
Warner.
 Burford, model O3.
 Concord, all models.
 Dart, model L.
 Federal, models W and X.
 Gary, model K.
 Highway Tractor.
 Kissel, models ¾, 1½ and 3½.
 Pull-More.
 Rennoc-Leslie, all models.
 Sanford, model W35.
 Tiffin, model GW.
 Western.
Detroit.
 Bethlehem, all models.
 Clydesdale, model 25.
 Commerce.
 D-E, model J.
 Nash, model 2017.
 Sanford, model W25.
 Selden, model G.
 Tiffin, models A and AW.
Fuller.
 Acason.
 Available.
 Beck, all models.
 Ressemer, model G.
 Brockway.
 Corbitt, models D and E.
 Dart, model E.
 DeKalb, all models.
 Diamond T.
 Erie.
 Forschler-Dual.
 Forschler, all models.
 Gary, models F, G, H and HU.
 Grant.
 Hendrickson, model G.
 Hercules.
 Hewitt-Ludlow.
 Higrade.
 Hoover.
 Hurlburt.
 Independent.
 Jumbo.
 Landshaft.
 Lane.
 Lapeer, all models.
 Larrabee-Deyo, models M, N and O.
 Manly.

Master, model M.
 Maxfer.
 Menominee.
 Muskegon.
 Nelson & LeMoon.
 Oklahoma.
 Old Reliable.
 Pan-American.
 Palmer, all models.
 Racine.
 Republic, models 10, 11 and A.
 Revere.
 Sandow, model A.
 Service, model 220.
 South Bend.
 Stewart, models 9 and 7.
 Sullivan.
 Superior, model C.
 Taylor.
 Tower.
 Trabold.
 Triangle.
 Union.
 United.
 Van Winkle.
 Weier-Smith.
 White-Hickory.
 Wilcox.
 Wisconsin, all models.

REAR AXLE MANUFACTURERS.

Timken.
 Acason, all models.
 Acme, all models.
 Armleder, all models.
 Atterbury, all models.
 Available, all models.
 Bessemer, models D and E.
 Bourne, all models.
 Brinton.
 Brockway, models K3 and R.
 Clydesdale, models 45, 65, 90 and 120.
 Concord, all models.
 Croce.
 Dart, all models.
 De Kalb, all models.
 Diamond T, all models.
 Dorris.
 Fageol.
 Federal, all models.
 Garford Tractors, 4½ and 7½ tons.
 Gabriel.
 G-M-C, models 21, 21, 41, 71A, 101A.
 Hahn, 1½ and 3½ tons.
 Hall all models.
 Hendrickson, all models.
 Horner, all models.
 Kissel, 2 tons.
 Kleiber, models AA, BB, C and D.
 Lane, model B.
 Lippard-Stewart, all models.
 Little Giant, models 15 and H.
 Maccar, all models.
 Mack, AB 1, AB 1½ and AB 2 tons.
 Menominee, all models.
 Modern.
 Mogul.
 Moreland, all models.
 Nelson & Le Moon, all models.
 Netco.
 Niles, all models.
 Old Reliable.
 Oneida, all models.
 Rainier.
 Rowe.
 Sandow, all models.
 Selden, models B, C and D.
 Service, all models.
 Signal, all models.
 Standard, all models.
 Sterling, 3½ and 5 tons.
 Sullivan, model E.
 Thomas, all models.
 Tiffin, models MC and MW.
 Velle, all models.
 Watson Tractor.
 Witt-Will, all models.
Sheldon.
 American.
 Brockway, model J3.
 Burford, model D3.
 Chase, all models.
 Corbitt, all models.
 D-E, model J.
 Forschler.
 Gary, all models.
 Gramm-Bernstein, all models.
 Harvey, all models.
 Higrade.
 Hoover.
 Indiana, models D, R and L.

Kissel, 1½ and 3½ tons.
 Kleiber, models A and C.
 Lamson, all models.
 Lane, model C.
 Larrabee-Deyo, all models.
 Noble.
 Old Reliable, 2, 4 and 5 tons.
 Royal, 1, 2, 5 and 7 tons.
 Sanford, all models.
 Selden, model G.
 Sterling, 2½ tons.
 Tiffin, models AW, GW, RW and SW.
 United States, models H, J and K.
 United, all models.
 Wichita, all models.
 Wilcox, all models.
 Wilson, 2 and 3½ tons.
 Wisconsin, all models.
Clark.
 Beck, 1 and 2 tons.
 Denby, 5 tons.
 Globe, 1 and 2 tons.
 Hawkeye, 1 ton.
 Nash, 1 and 2 tons.
 Jumbo, 2 tons.
 Republic, 3 tons.
 Sanford, 1 and 2 tons.
 Stewart, ¾, 1, 1½ and 2 tons.
 Triangle, 1 ton.
 United, 5 tons.
 Winther, 2, 3, 4 and 5 tons.
Torbenesen.
 Bessemer, models G and J.
 Commerce.
 Corliss.
 Erie.
 Grant, model 12.
 Hahn, ¾ ton.
 Koehler, all models.
 Lapeer, all models.
 Luverne.
 Master, model M.
 Muskegon.
 Maxim.
 Pan-American.
 Panhard.
 Palmer, 1 ton.
 Republic, ¾ ton, models 10, 11 and A.
 Superior.
 Trabold.
 Taylor.
 Turnbull.
 United.
 Winther.
Hess.
 Atlas.
Hayes.
 D-E, models A, B and C.
 Lane, model F.
 Rennoc-Leslie, all models.
Salisbury.
 Commerce.
Collier.
 Stewart.
 Tulsa.
Gemco.
 Ellsworth.
Walker-Weiss.
 Vim, model 21.
Russel.
 Bethlehem, all models.
 Columbia.
 Denby, all models.
 Fargo.
 Fulton.
 Globe.
 Iowa.
 Independent.
 Knox.
 Little Giant, model H.
 Selden, models TXL and BR.
 Tiffin, model A.
 Union.
Empire.
 Gersix.
Keystone-Hindly.
 Blair, all models.
T. D. B.
 Dayton, 3½ ton.
 G-M-C, model 16.
Weston-Mott.
 Gem.
S. A. & P.
 Old Reliable 2½ tons.

SPRING MANUFACTURERS.

Perfection.
 A. & B., all models.
 American.
 Bessemer, all models.
 Chase, all models.

Clydesdale, models 45, 65, 90 and 120.
 Columbia.
 Fulton.
 Horner.
 I-H-C, all models.
 King.
 Modern.
 Netco.
 Overland all models.
 Rainier.
 Sanford, all models.
 Selden, all models.
 Signal, all models.
 Taylor, all models.
Higgins.
 Beck, all models.
 Dearborn.
 Champion.
Mather.
 Armleder, all models.
 Bourne, all models.
 DeKalb all models.
 Fageol.
 Lippard-Stewart, all models.
 Mack, all models.
 Nash, model 4017.
 Onelda, all models.
 Sterling, 3½, 5 and 7 tons.
 Union.
 Velle, all models.
 Winther, all models.
Detroit.
 Acason, all models.
 Acme, all models.
 Commerce.
 Foschler.
 G-M-C, models 21, 31, 41 71A and 101A.
 Hall, all models.
 Master, model M.
 Republic, ½ ton, models 10, 11 and A.
 Sandow, models A and B.
 Stewart, all models.
Tuthill.
 Available, all models.
 Dispatch.
 Gary, all models.
 Hawkeye.
 Hendrickson.
 Menominee, all models.
 Nelson & LeMoon, all models.
 Old Hickory.
 Packett.
 Standard, all models.
 United States, models E and D.
Sheldon.
 Bethlehem, all models.
 Blair, all models.
 Corbitt, all models.
 Ellsworth.
 Globe.
 Gramm-Bernstein all models.
 Harvey, all models.
 Hoover.
 Hercules.
 Pan-American.
 Republic, models T and V.
 Service, models 220, 270, 275 and 300.
 Sterling.
 Sullivan, model E.
 Titan.
 United States, models, H, J and K.
 Vim.
 Watson Tractor.
 White-Hickory.
 Wichita, all models.
 Wilcox, all models.
 Wilson, all models.
 Wisconsin, all models.
 Wlitt-Will, model WD 18.
Merrill.
 Brockway, all models.
 Hurlburt, all models.
 Larrabee-Deyo, all models.
 Maccar, all models.
 Sullivan, model F.
 Walter.
Russel.
 Fargo.
Kalamazoo.
 Indiana, models T and D.
 Lane, all models.
 Noble.
 Reya.
 Service, models 230 and 240.
 Tiffin, all models.
 Universal, all models.
Betts.
 Kleiber, all models.
Penn.
 Reo, all models.

Iron City.
 D-E.
 Fulton.
 Koehler.
 Pull-More.
 Republic.
 United.
Hess.
 Clydesdale, model 25.
Iron City.
 D-E, all models.
 Knox, all models.
Western Mott.
 G-M-C, model 16.
National.
 Schacht, all models.
Liggett.
 Kearns.
 Lapeer, all models.
Champ.
 Palmer, all models.
Standard.
 Lang, all models.
 Peerless, 2 and 3 tons.
 United FWD.
Rowland.
 Rennoc-Leslie, all models.
Garden City.
 Western.

STEERING GEAR MANUFACTURERS.

Gemmer.
 Armleder.
 A. & B., all models.
 Atterbury.
 Brockway.
 Denby.
 Diamond T, all models.
 Federal, all models.
 Gabriel.
 Hall, all models.
 Kelly-Springfield, all models.
 Luverne.
 Lang, model C.
 Mack, all models.
 Menominee, all models.
 Niles, all models.
 Reya.
 Schacht.
 Studebaker, all models.
 Triangle.
 United, models DSW, ESW and Tractor.
 Velle, all models.
 Watson.
 Wilcox, all models.
Ross.
 Acason, all models.
 Acme, all models.
 Armleder, all models.
 Barber Tractor.
 Bessemer, all models.
 Bourne, all models.
 Burford, all models.
 Clydesdale, all models.
 Concord, model A.
 Corbitt, models D, C, B, A and AA.
 Dart, all models.
 Dayton, all models.
 D-E, models A, B and C.
 DeKalb, all models.
 Denby, models 12 and 15.
 Dorris.
 Fageol.
 Foschler, all models.
 F-W-D.
 Garford, all models and tractors.
 Gersix.
 Gramm-Bernstein, all models.
 Hahn, all models.
 Harrison, model F.
 Harvey, all models.
 Hendrickson, all models.
 Hercules, all models.
 Horner, all models.
 Hurlburt, 5 and 7 tons.
 I-H-C, all models.
 King.
 Kissel, 3½ ton.
 Kleiber, all models.
 Knox, all models.
 Lamson, all models.
 Lapeer, all models.
 Lippard-Stewart, models W, HW, F and G.
 Little Giant, model 16.
 Maccar, all models.
 Modern.
 Moreland.
 Netco.
 Noble.
 Old Reliable, 1½, 2, 2½, 3, 4, 5-ton models

Onelda, all models.
 Packard, 5 and 6-ton models.
 Palmer, all models.
 Pull-More.
 Republic, models T and V.
 Riker, all models.
 Rowe, all models.
 Royal, all models.
 Sandow, models B and E.
 Sanford, all models.
 Selden, models C and D.
 Service, all models.
 Signal, all models.
 Standard, all models.
 Steele, all models.
 Sterling all models.
 Stewart, all models.
 Sullivan, all models.
 Taylor, all models.
 Thomas, all models.
 Tiffin, models PW, RW and SW.
 Union.
 United, models BSW and CSW.
 Western.
 White-Hickory.
 Wichita, all models.
 Wilson, all models.
 Winther, all models.
 Wlitt-Will, all models.
Lavine.
 American.
 Atlas.
 All-Four Drive.
 All-Power.
 Acme Wagon.
 Beck, all models.
 Bethlehem.
 Blair, all models.
 Brinton.
 Brockway, all models.
 Casey.
 Chase, all models.
 Clinton.
 Commercial Truck.
 Corbitt, model E.
 Croce.
 Corliss.
 Duplex.
 Erie.
 Forschler.
 Fulton.
 F-W-D.
 Gary.
 Globe.
 G-M-C, models 21, 31, 41, 71 and 101A.
 Hahn.
 Hawkeye.
 Hendrickson.
 Hewitt-Ludlow.
 Higrade.
 Horner.
 Hoover.
 Hurlburt, all models.
 Indiana, all models.
 Kearns.
 Kimball.
 Kissel, 2 tons.
 LaFrance.
 Lane, all models.
 Larrabee-Deyo, all models.
 Master, model M.
 Maxfer.
 Muskegon.
 Manly.
 Nash, model 4017.
 Nelson & LeMoon, all models.
 New York.
 Norwalk.
 Olympian.
 Pan-American.
 Racine.
 Rainier.
 Rennoc-Leslie.
 Schmeer.
 Stockdale-Meyers.
 Selden, models G and TXL.
 Sterling.
 Tiffin, model A.
 Titan.
 Tower.
 United States, all models.
 United FWD.
 Viall.
 Voltz.
 Van Winkle.
 C. A. S.
 Norwalk.
 Stewart, model 6.
Jacox.
 Buick.

Commerce.
G-M-C, model 16.
Grant.
Little Giant.
Kissel, $\frac{3}{4}$ and $1\frac{1}{2}$ tons.
Nash, model 2017.
Republic $\frac{3}{4}$ tons, models 10, 11 and A.
Rush.
Selden, models B and BR.
United.
Vim, model 21.
Hayes.
Commerce.
Forster.
Dispatch.
Ellsworth.
Gem.
Warner.
Concord, model B.
Ditt Weller.
Grant, model 12.
Tiffin, models AW, GW, MC and MW.
Harnes.
Schacht, all models.
UNIVERSAL JOINT MANUFACTURERS.
Acme.
Indiana, models D and R.
Lane, all models.
Arvac.
Atlas.
Chevrolet.
Dart, all models.
Denby.
Defiance.
Gramm-Bernstein.
Grant.
Indiana, models D and W.
Master.
Muskegon.
Panhard.
Rainier.
Republic, models 10, 11 and A.
Rowe.
Service, model 220.
White-Hickory.

Blood Bros.
Acason, all models.
Acme.
Beck.
Bessemer, models G and J.
Bourne, all models.
Chase.
Covel.
Dayton.
Duplex.
F-W-D.
Fulton.
Gary, all models.
Gersix.
Hewitt-Ludlow.
Higrade.
Independent.
Lowell.
Mack.
Menard.
Menominee.
Niles.
Noble.
Peerless.
Schacht.
Sullivan.
South Bend.
Trabold.
United.
United States.
Winther, all models.
Franck.
A. & B., all models.
Hartford.
D-E, all models.
Netco.
Old Reliable, models $2\frac{1}{2}$, 4, 5 and 7 tons.
Rennoc-Leslie, all models.
United States, all models.
Kinsler-Bennet.
De Kalb, all models.
Hall, all models.
Knox, all models.
Koehler, all models.
Republic, model T.

Western.
Merchant & Evans.
American.
Reo, all models.
Hercules, all models.
Norwalk.
Collier.
Rold.
Reo, all models.
Spicer.
Armleder, all models.
Bessemer, models D and E.
Brockway, all models.
Columbia.
Commerce.
Diamond T, all models.
Fargo.
Federal.
Garford, all models.
Geneva.
Hahn.
Harvey, all models.
Indiana, model L.
Lippard-Stewart, all models.
Maccar, all models.
Old Reliable, models $1\frac{1}{2}$, 2, 3 and 4.
Onelda, all models.
Peerless, all models.
Sanford, all models.
Selden, models TXL, B, BR, C and D.
Service, models 220, 240, 270, 275 and 306.
Signal, all models.
Sterling, $2\frac{1}{2}$ tons.
Velle, all models.
Vim, model 21.
Watson Tractor.
Wilcox, models S and W.
Witt-Will.
Universal.
Bethlehem, all models.
G-M-C, all models.
Hawkeye.
Larrabee-Deyo, all models.
Republic, $\frac{3}{4}$ ton.
Sterling, $3\frac{1}{2}$, 5 and 7 tons.

BUDA ENGINE TESTS.

All engines built by the Buda Co., Harvey, Ill., are subjected to very exacting tests after assembly to insure that they function to a standard and that they produce the rated power. The accompanying photograph shows the testing room at the plant, in which are 47 Sprague electric dynamometers of different sizes and capacities. The company has discontinued "belting in" engines, and after assembly each engine is installed on one of the dynamometer sets, the dynamometer being used to drive the engine, and "run in" until it runs freely.

Next it is given a long run under its own power to insure that all the bear-

ings are thoroughly surfaced and the friction is minimized. Each engine is then dismantled, the pistons removed and the bearings examined and after such adjustments as are necessary are made the engine is reassembled. Another test is then made, pulling a load on a dynamometer, in which each engine must run with perfect freedom, showing by the dynamometer that it delivers the full power output.

The company believes that the method of testing is as thorough as it is unusual, since every engine is so tested, while there is also belief that some other engine manufacturers test by running one machine of a number on a dynamometer, and there is claim that every engine

should be tried and proven to be up to the standard in smooth, silent and efficient horsepower production.

GOETHALS FOR TRANSPORTATION.

Major-General George W. Goethals of the Quartermaster Corps has been appointed Director of War Department Transportation. This appointment will cooperate under one head the design, production and purchase of motor trucks for the various departments of the army.

S. A. E. MEMBERSHIP INCREASED.

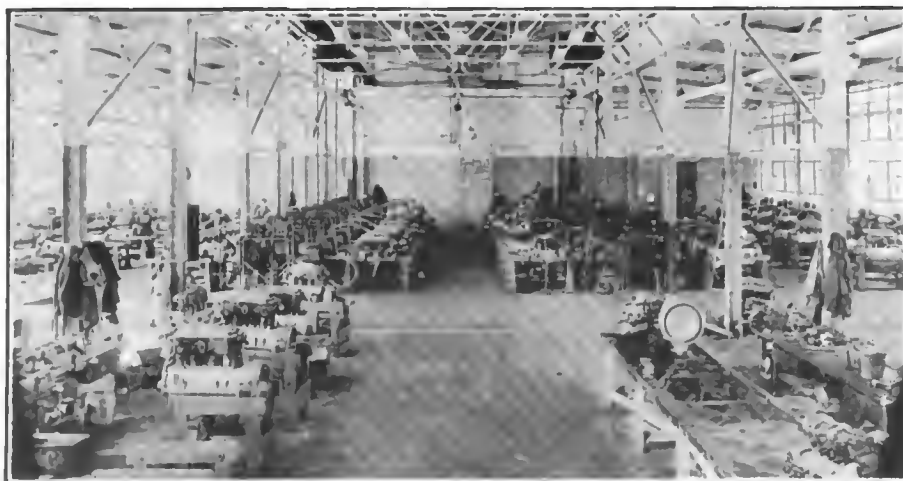
During the year just closed the Society of Automotive Engineers increased its membership nearly 50 per cent. At the close of the year the rolls of the society showed a total membership of 3119 as compared with 2121 at the close of 1916.

BRODERICK WITH BURD RING.

E. N. Broderick, well known in jobbing circles as a salesman of automobile accessories, has been appointed a special representative of the Burd High Compression Ring Co., Rockford, Ill.

D. F. WHITAKER RESIGNS.

Donald F. Whitaker has resigned as sales and advertising manager of the Detroit Truck Co.



Section of the Testing Department of the Buda Co., Harvey, Ill., Equipped with 47 Sprague Dynamometers for Proving Engines.



H. H. Henry, President and General Manager, Dart Motor Truck Co.

HENRY HEADS DART CO.

H. H. Henry has been elected president and general manager of the Dart Motor Truck Co., Waterloo, Ia., builder of Dart trucks. Mr. Henry is well known in the Middle West, he being for about 10 years supply agent of the Bell Telephone Co. in that city, where he qualified as a capable executive. Later he retired to become manager of the Maxter Truck Co. of Chicago, and largely through his good management the concern became well established. When the Dart company wanted to strengthen its organization an offer was made Mr. Henry, who is now its active head.

Following the election of Mr. Henry Milo D. Herron was appointed general sales manager of the Dart company. Mr. Herron entered the industry as manager of the Auto Efficiency Co., which brought him into contact with truck users, so that he has a first hand knowledge of their requirements and needs for service. In 1914 he was made manager of sales of the New York branch of the Federal Motor Truck Co., and he resigned this association to assist in the formation of the Thomas Motor Truck Co., from which organization he retired to join the Dart company.

NETCO TRUCK MERGER.

The New England Truck Co., Fitchburg, Mass., and the Welch & Sutherland Co., also of that city, have merged. The combined company will be operated as the New England Truck Co., which has been making the Netco truck for the past three years. This business will be continued, together with that of manufacturing truck bodies and motor car painting.

The Hamilton Motors Co., Grand Haven, Mich., has issued a new price list on the Panhard trucks. The one-ton model is priced at \$985 and the 1½-ton model at \$1185.



Milo D. Herron, Sales Manager, Dart Motor Truck Co.

LITTLE GIANT TRUCK CO. FORMED.

The Chicago Pneumatic Tool Co. has organized the Little Giant Truck Co. to handle the truck business which was formerly conducted as a separate department of its business. The headquarters will be continued in the Little Giant building, 1615 Michigan avenue, and the control and management will remain in the hands of the same interests that operate the Chicago Pneumatic Tool Co. and with the same officers as follows: President, W. O. Duntley; secretary, W. B. Seelig; treasurer, L. Beardsley, and sales manager, T. J. Hudson.

The new plant of the Duplex Truck Co., Lansing, Mich., consists of two two-story buildings, 402 by 72 and 306 by 72 feet respectively, with 101,950 square feet of floor space. The expected production is 300 trucks a month.



Harry A. Conlon, Sales Manager, Acason Motor Truck Co.



H. S. Yates, District Manager, Truck Sales, International Harvester Co.

YATES DISTRICT MANAGER.

With decision to build three times as many trucks in 1918 as it did in 1917, the International Harvester Co., builder of IHC trucks, has appointed H. S. Yates of Toledo, O., assistant to Truck Sales Manager O. H. Browning, and he will cover the eastern half of the country. Mr. Yates started in the Toledo service department of the IHC in 1904. He served in various departments, for a time being stationed in South America, and finally became a blockman. Later he did general sales work in all departments and was then appointed branch manager at Toledo. He has been advanced because of his unusual qualifications.

KANARY MANAGES UNITED MOTORS.

M. H. Kanary, president and general manager of the Samson Trailer Corporation, Grand Rapids, Mich., and president of the Chicago Structural Steel Co., Chicago, has been appointed general manager of the United Motors Co. He succeeds George P. Sweet, who has received a commission of captain in the Signal Corps of the aviation department under Captain Edwin S. George.

FRIEND WITH UNITED MOTORS.

Otis C. Friend, who recently retired as president of the Mitchell Motors Co., has been elected vice president of the United Motors Corporation and will assume his new duties about Feb. 15 at the company's headquarters in the Aeolian Hall building, 33 West 42nd street, New York City.

MCBRIDE WITH LEWIS-HALL.

V. K. McBride has joined the forces of the Lewis Hall Iron Works, Detroit, Mich., and will be connected with the truck department. He was formerly with the American Motor Truck Co. of Detroit.

TRUCK INDUSTRY PLEDGED TO NATION

DESIRE to have fullest cooperation with the government, no matter what the industrial sacrifice, because patriotism subordinated all else, was the crystallized sentiment of the conference of truck manufacturers held at New York City, Jan. 8, at the headquarters of the National Automobile Chamber of Commerce, 7 East 42nd street. The convention, called by the commercial vehicle committee of the N. A. C. C., considered three main propositions, a clear understanding of which were believed necessary that the industry might do all that was possible that the war objects of the nation should be best served. These were first, service to the government, cooperating with its motor truck program; second, service to the government, in assisting to relieve the railroad congestion by the use of motor trucks; third, service to the motor truck industry so that manufacturers may better understand the demands to be made upon them and be better prepared to meet them.

The convention was attended by representatives, usually officials, of nearly 100 concerns, and both the morning and afternoon sessions were extremely interesting. Nine separate addresses were made, which were followed by brief discussion, and a series of resolutions were adopted that clearly established the purposes and objects of the industry in all relations with the government.

The conference was directed by Windsor T. White, chairman of the commercial vehicle committee of the N. A. C. C., who presented the speakers. Col. Charles Clifton, president of the N. A. C. C., executive of the Pierce-Arrow Motor Car Co., who is known as one of the most prominent men of the industry, opened the conference with an intensely patriotic speech, emphasizing that there was seemingly little realization that the nation was at war. He urged that the people should be united in all questions, policies and activities; that all should be impressed that great sacrifices were necessary; that every resource should be pledged and given willingly that the men on the battle line should lack nothing that was needed to wage the conflict.

The addresses during the morning session were: "Maintaining a Record of Unselfish Cooperation," George M. Graham, assistant commercial manager, Pierce-Arrow Motor Car Co.; "Delivering Army Trucks by Highway," Maj. Edward Orton, Jr., Quartermaster's Department, U. S. A.; by Hugh Chalmers of the Automotive Industries Committee; by H. L. Horning, chairman, Automotive Section, War Industries Board. Of these, that by Maj. Orton informed the conference that the policy of the Quartermaster's Department was to drive trucks from the plants of the builders to the shipping ports on the Atlantic coast, the object being to carry loads, which otherwise would be shipped by railroad, and to train the drivers by actual road work. This brought up the

subject of training drivers, which was regarded as exceedingly important, and various suggestions were made with reference to having soldiers receive some instruction in truck assembling and adjusting at the factories before driving the trucks away. There was some interesting discussion as to possibilities and the results of such brief training.

The afternoon was given over to papers and addresses and discussion. The papers were "Legislation Affecting the Use of Motor Trucks," by Windsor T. White, read by General Manager Alfred Reeves; "Work of the Highways Transport Committee," by Roy D. Chapin, chairman of the committee; "Highways for Heavy Haulage," by George C. Diehl, Buffalo, chairman of the Good Roads Committee of the American Automobile Association; "Motor Trucks in Short Haul Work," by George H. Pride of the Highways Transport Committee, and operating the Heavy Haulage Co., New York City.

With reference to these addresses there was no suggestion of a plan for systematically operating motor trucks on the highways of the country to relieve the railroads of what is generally known as local freight, nor was there definite proposition of how the congestion at the freight terminals could be reduced. The subjects were very logically presented, but no practical proposal that could be applied the country over, or in whatever sections of the country were necessary, was made. Chairman Chapin in his address referred to a plan originated by Mr. Pride in some Connecticut cities where bureaus were established which could be called by truck drivers sent to these places to learn whether or not return loads could be obtained.

What was probably the clearest statement of the attitude of the government toward the industry ever presented was the brief address by Christian Grl, Director of Production of the Motor Truck Division, Quartermaster's Department, U. S. A., which was entitled "Motor Trucks for the Army," and was as follows:

"With the desire of the government some time ago to get the standardized truck, the speaker was called to assist in carrying out that program. Of the Class B, or heavy duty trucks, the samples of which have been completed, we expect probably 50 to 100 trucks this month. Three samples of the Class A, or two-ton truck, have been completed, and, I understand, they are doing pretty well on Class A. The sample truck AA will be completed in two or three weeks, but we haven't yet ascertained how many of these AA trucks can be made.

"I wish to bring what I think will be good news to you. In your business you have one purchasing agent and one production manager. I believe much of the duplication of effort can be saved in

Washington—and this is a time for action and not talk—by cooperating and coordinating the motor truck business of the government under one head. That plan has been suggested to the Quartermaster General, General Goethals, and has also been proposed to the Secretary of War. I am happy to tell you that in both offices the plan has received hearty approbation, and I believe that within a very short time you will be able to talk to one man, or a set of men, in Washington about the government motor trucks throughout.

"The best thing that we can do is to guide the motor truck business for the government into the safest possible channels, and I think the safest channels are those that we know the most about.

"We have further asked that a very competent—in fact, the most competent—truck maker whose services can be had by the government be placed in charge of this work. A number of us have been asked to suggest such a man.

"A plan has been laid down whereby the motor truck makers of the country will be called in to run the truck business for the government. If the government can't trust an industry at this time, then the industry isn't worth fighting for. It must trust every industry and organize every industry if it wants to get anywhere in this war. At this time the action on the other side of the water is too rapid for us to wait.

"I believe if our plans are generally adopted a committee will soon be formed of the truck makers, the assemblers and parts makers that will deal for the government with the industry, and with some one man whom the government may choose from among you to conduct it, who knows you, who knows your strength and your weakness. If that can be done we hope that this organization and this body will get behind that program and take the burden off the government's hands.

"Some time ago we had the privilege of interviewing the Secretary of War and we said to him, 'If you will place upon industry the burden of caring for the army and navy, tell industry what the army and the navy want, what you want to fight with (you have the right to write the specifications, but give to industry the responsibility and the authority), industry will deliver the goods.' It will also be true, I am sure, in the carrying out of this program if it is adopted."

In connection with the meeting a statement was made by J. F. Winchester, secretary of the Motor Truck Club of New Jersey, of the need of influence being brought to suspend, for the period of the war, the statute that became effective Jan. 1, which would, if enforced, prohibit the use of many and greatly lessen the utility of trucks on New Jersey highways.

S. M. Williams of the Garford Co., Lima, O., urged that national attention

be immediately given to constructing highways in the different states that would endure under heavy vehicle traffic, and the deferring less important work until later on.

The conference unanimously adopted the following resolutions:

That the motor truck manufacturers of the United States, in convention assembled in New York on Jan. 8, hereby tender to the President of the United States, to the Secretary of War and to the Council of National Defense, their services and cooperation in meeting the transportation needs of the government and the country, and offer the facilities of their factories to aid in the prosecution of hostilities against the governments of the countries with which the United States is at war. It is resolved, That copies of this resolution be addressed to the President and the Secretary of War.

Whereas, the great unprecedented crisis in the railroad transportation service of the country has made extraordinary development of motor trucking by highway to meet the needs of the War Department of the government and of the industry and commerce of the United States, and

Whereas, it is essential to the effective use of motor vehicles as a measure of relief of freight and express congestion that the main highways be put and kept in good usable condition for the movement of the products of farm and factory, it is

Resolved, That the director-general of the railroads be urged to raise the embargo against the use of open-top railroad cars for the shipment of road materials and machinery in sufficient time to permit of resumption of highway construction and repair early next spring in the northern states and, if conditions permit, that this portion of the order be rescinded insofar as it affects the southern states and California.

Resolved, That a committee of five representatives of motor truck manufacturing companies be appointed by the president of the National Automobile Chamber of Commerce to cooperate with and assist the Highway Transport Committee of the Council of National Defense in working out problems arising in connection with the organization and development of transportation by public highway for the relief of railroad freight congestion and to facilitate the movement of military trucks and the transportation of the mails.

Resolved, That the representatives of motor truck companies in attendance at this convention indorse unanimously the work and plans of the Highways Transport Committee of the Council of National Defense and hereby tender the full cooperation of the motor truck industry in developing ways and means for increasing the effectiveness of the motor truck in moving merchandise and other freight and express matter.

Resolved, That the motor truck manufacturers of the United States, assembled in convention Jan. 8, 1918, who view with increasing apprehension the various forms of drastic motor truck legislation already passed and other forms threatened, hereby appeal to the Council of National Defense, asking the council to request the various states in this time of stress when transportation is the need of the hour, to refrain from passing or enforcing any unreasonable legislation that would interfere with motor truck legislation.

CAPT. BRITTON NOW A MAJOR.

Captain W. M. Britton, Q. M. C., has been commissioned a major. He is well known in the industry and became prominent through his work in association with the engineers and army men who developed the Liberty trucks.

HYATT ENLISTMENT DINNER.

An incident of patriotic interest at least to the employees of the Chicago office of the Hyatt Roller Bearing Co., was a dinner recently given in honor of two of their number who had joined the colors. J. E. Martin is with the mobile ordnance corps and is stationed at Clintonville, Wis., and T. A. Russel is at the aviation school at Ithaca, N. Y.

The dinner was more than a formality, for it was a leave taking of friends who had endeared themselves by qualities that were keenly appreciated. C. M. Eason, manager of the tractor bearings division of the Hyatt company, stated that the company had made a genuine war sacrifice in losing two men who had given it splendid service. The occasion, despite its object, was greatly enjoyed. Those attending the dinner, shown in the accompanying illustration, from left to right, were: Standing, H. O. K. Maister, H. W. Parker, P. W. Gosselin, H. M. Carroll, E. P. Stahl, C. E. Stoddard, F. A. Dean, A. P. Mabr and George O.



Employees of the Hyatt Roller Bearing Co., Chicago Branch, Give Enlistment Dinner to Fellows Joining the Colors.

Heimstaedter; sitting, C. W. Young, J. E. Martin, C. M. Eason, T. A. Russel, W. L. Hiff and J. R. Bateman.

BENJAMIN SAXON SALES MANAGER.

H. A. Benjamin has been appointed sales manager of the Saxon Motor Car Corporation of Detroit and will have charge of the sales campaign that is being inaugurated by the new management of the company. He was formerly with the National Cash Register Co. of Dayton, O., and was president of the 100 Per Cent. Club.

RECEIVER FOR RUSH TRUCK CO.

The Rush Motor Truck Co., Philadelphia, Pa., has been placed in the hands of a receiver. The liabilities of the company are estimated at \$140,000 and the assets at \$30,000. Charles Este, Jr., who was appointed receiver by Judge Thompson in the United States District Court, was required to furnish a bond of \$50,000.

M. A. M. A. ANNUAL BANQUET.

Over 500 members attended the annual banquet of the Motor and Accessory Manufacturers' Association, held in New York on Jan. 9. President Charles W. Stiger delivered an address of welcome, which was followed by an entertainment, including a talk by Corp. R. Derby Holmes of Boston, who described his experiences in France while connected with an English regiment.

At the annual meeting of the organization four retiring directors were elected. They are: Christian Grl, Standard Parts Co., Cleveland; E. H. Broadwell, Fisk Rubber Co., Chicopee Falls, Mass.; E. W. Beach, Manufacturers' Foundry Co., Waterbury, Conn.; L. M. Wainwright, Diamond Chain and Mfg. Co., Indianapolis, Ind. The Board of officers were re-elected as follows: President, C. W. Stiger, Stromberg Motor Devices Co., Chicago; first vice president, C. E. Thompson, Steel Products Co., Cleveland; second vice president, E. H. Broadwell, Fisk Rubber Co.; third vice

president, T. J. Wetzel, Precision Die and Casting Co.; treasurer, L. M. Wainwright, Diamond Chain and Manufacturing Co.; assistant treasurer and secretary, W. O. Rutherford, B. F. Goodrich Co. Mr. Sloan, who was formerly assistant treasurer, continues as a member of the board of directors.

FOLEY WITH EDISON BATTERY.

Frank J. Foley, formerly manager of the mining department of the Westinghouse Electric and Manufacturing Co., has been appointed manager of the mining and traction department of the Edison Storage Battery Co., Orange, N. J.

WILL HANDLE FAGEOL TRUCKS.

The Butler-Veith Co., Berkeley, Cal., will handle the truck output of the Fageol company throughout the United States. A branch, in charge of W. A. Kruckey, has been opened at 1623 Market street, San Francisco.



First Fleet of Seven Acason Trucks, Part of a Government Order, Driven from the Detroit Factory to Philadelphia.

NEW DENBY FIVE-TONNER.

In Design the Machine Follows Closely the Smaller Trucks.

The new Denby five-ton truck was shown for the first time in the freight vehicle department of the Detroit automobile show, although the series is in production and shipments are being made. The machine has the characteristics of the smaller Denby trucks, having a cast tank radiator, a tapered hood, a cylindrical gasoline tank on the dash, a deep frame with wide webs and is driven by internal gears without radius or torsion rods.

The truck has been simplified so far as possible and it is built to have extreme strength and endurance in heavy duty. The engine, which is claimed to show 50 horsepower by brake test, has cylinders cast in pairs and it is assembled with a multiple disc clutch. The power plant is equipped with magneto ignition and a governor. It is suspended at three points so that it is protected against chassis distortion.

The power is transmitted through a sliding gear selective gearset having four forward speed ratios that is mounted amidships, there being a reduction on the first speed ratio of five to one. As there is final reduction of 12½ to one in the rear axle, the total reduction on the low ratio is 62½ to one, which insures great power when it is most needed. Following the Denby design the rear axle is internal gear driven, and the driving thrust and torque are absorbed by the rear chassis springs. The springs are 54 inches long and four inches wide. The rear wheels are 40 inches diameter and the brakes are unusual size, being 29½ inches diameter. Both sets of brakes are internal shoe type, expanding within the wheel drums.

The rugged disc wheels are shod with 36 by six-inch tires forward and 40 by six-inch dual tires at the rear. There is a heavy bumper, a radiator guard, which, with the large frame, impressed one with the exceptional strength that is claimed for the machine. The first truck of this type produced was recently driven overland from Detroit to New York City via Pittsburgh and Washington. This drive was nearly 1000 miles

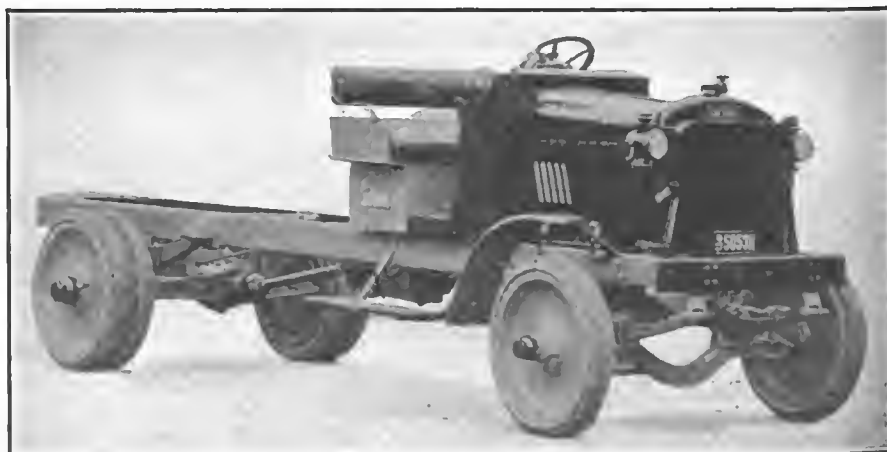
and carrying capacity load the truck climbed easily the worst mountain roads in Pennsylvania. All ascents were made without going below the second speed and without boiling the water in the cooling system. The power of the truck was surprising. The road was extremely bad at times and twice the Denby was driven around smaller machines helplessly mired, and pulled them back on the roadway. The truck, on arrival in New York, was delivered to the buyer.

TORBENSEN MAKING FRONT AXLES.

The Torbensen Axle Co., Cleveland, O., is now ready to market a series of front axles to correspond in size and quality with the rear axles where heretofore have been the exclusive product of the company. The series includes type OO-2, ¾ to two ton; type AA, one to 1½ tons; type CC-2, two to 2½ ton.

NEW CHASE OFFICERS.

The directors of the Chase Motor Truck Co., Syracuse, N. Y., recently elected the following officers for the ensuing year: President and treasurer, Carleton A. Chase; vice president, H. P. Bellinger; secretary, E. C. Witherby; general manager, G. N. Allen. The former president of the company, A. M. Chase, was recently commissioned a major in the motor truck division of the Ordnance Department at Washington.



The Complete Denby Five-Ton Truck Chassis, the Largest Unit Yet Built, That Conforms to Practically a Standard Design.

ACASON AFTER RECORD.

The Acason Motor Truck Co., Detroit, Mich., has begun making delivery of trucks at Philadelphia, Pa., by driving them over the road from the factory. These machines are being built to fill a government order. The first group of seven trucks was started from the factory at 10:30 a. m. Jan. 10, there being five five and two two-ton units. The convoy reached Toledo, O., 60 miles, at 7 in the evening, which was believed to be a record drive for the distance, considering the road conditions. The following day the trucks left for Mansfield, O., via Findlay, and thence the route was eastward through Pittsburgh. The intention of the company is to dispatch the trucks in groups over the road as rapidly as they are produced by the factory.

LITCHFIELD IN WAR SERVICE.

P. W. Litchfield has been appointed by the Rubber Association of America as a member of the War Service Committee which represents the rubber industry in its relation with government work. Mr. Litchfield is vice president and factory manager of the Goodyear Tire and Rubber Co., Akron, O.

COLEMAN WITH SELDEN.

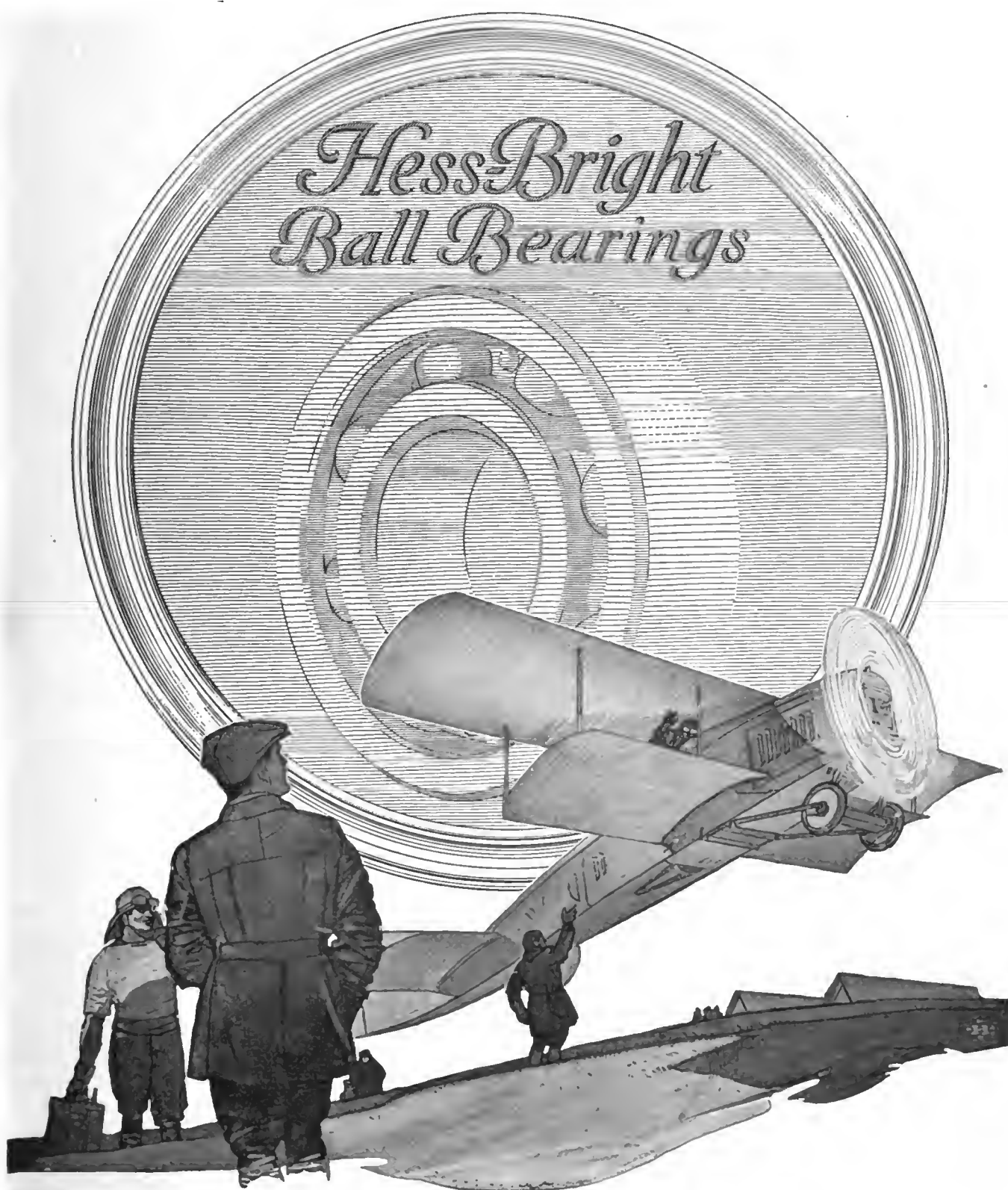
J. R. Coleman has been appointed factory manager in charge of production and purchasing for the Selden Motor Vehicle Co., Rochester, N. Y. He was formerly chief engineer and assistant general manager of the Atterbury Motor Car Co., Buffalo, N. Y.

FIRST TRIANGLE TRUCK.

The Triangle Truck Co., St. Johns, Mich., has completed its first 1½-ton truck. The company has increased its capital stock from \$50,000 to \$100,000 and a new factory is being erected.

FRESNO VIM TRUCK AGENCY.

The Vim Truck Co., Fresno, Cal., will handle the Vim truck in that territory and vicinity.



Where the Slightest Flaw Invites Destruction

IN the aeroplane—where the slightest defect in any part or material invites almost certain destruction and loss of life—you usually find Hess-Bright Ball Bearings. They are essential to machines in which dependa-

bility, endurance and faultless operation are imperative, and are invariably an indication of conscientious construction. The same is true regarding motor trucks—the better are Hess-Bright equipped.

Where Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)



Executives of Towar-Ayers Co., Detroit, Mich. At Left, John B. Hance, Sales Manager; at Right, Frank M. Hecox, Secretary-Treasurer.

EXCLUSIVE DENBY AGENT.

Towar-Ayers Co., Detroit, Mich., Concentrates on One Truck Make.

The Towar-Ayers Co., Detroit, Mich., a concern exceptionally successful selling trucks at retail, is now concentrating the endeavors of its sales force marketing Denby trucks. The company started less than two years ago and statement is made that with machines not well known in Detroit it developed until the average sales were more than one a business day.

One reason for this was that the company developed an organization of transportation engineers, and each prospect's delivery needs were analyzed and report made as to what equipment would best serve. This necessitated individual study of each work to determine type and capacities of bodies best adapted, either trucks, tractors, semi-trailers or trailers. Not infrequently the advice of the company was sought by business men, who realized the value of the information afforded to them.

Deciding that the make of truck sold must meet all requirements for capacities as well as have uniform quality, the company obtained agency for Denby trucks, which were regarded as meeting the needs of every one requiring haulage. The business is directed by John B. Hance, sales manager, and Frank M. Hecox, secretary and treasurer. The former was previously sales agent for the National Cash Register Co. in Louisville and St. Louis, and the latter was associated with the Rapid Motor Vehicle Co. before it was absorbed by the General Motors Truck Co., and continued with the GMC organization until the Towar-Ayers Co. was established.

NEW MUSKEGON TRUCK PLANT.

The Muskegon Engine Co., Muskegon, Mich., builder of Muskegon trucks, is now producing machines in a new plant that is regarded as being ideal from every viewpoint of manufacturing. The site of the works is a tract of 40 acres, sufficient for any expansion, conveniently accessible for the employees, on which

the first unit of the plant has been erected. This consists of a structure of concrete, steel and glass, with a head house two stories high, the remainder of the building one story. The floor space available for manufacturing is approximately 15,000 square feet. The general offices are on the ground floor of the head house and the engineering department is located on second floor.

Designed especially to meet the requirements of the company the building is admirably lighted and ventilated and is equipped with every convenience for the employees. The machine and tool equipment is extremely complete and with the facilities available the production will be extremely large for the proportions of the plant. The company has exceptional freightage advantages, for receiving and shipping can be done by spur tracks that connect with the G. R. & I. and the Pere Marquette railroads, so that highway haulage is minimized. The company is adequately financed and the purpose of the officials is to make it an extremely active factor in the industry from now on.

PROSPEROUS YEAR FOR WINTHER.

The Winther Motor Truck Co., Winthrop Harbor, Ill., which was organized only a year ago has made progress that was almost phenomenal. During the year the company designed, tested, completed and marketed six different models of Winther truck chassis, and on Jan. 19 a dividend of seven per cent. was paid on the preferred stock of the company.

Mr. Winther, who organized the company after his return from an eight months stay on the Mexican border as engineer for one of the well known truck builders, says that the remark-

able results that have been obtained were only possible where the same fundamental principles of design could be applied to truck chassis of all sizes, and it is a noteworthy fact that since the first Winther truck was built there has been no essential change in design, materials or construction.

UNITED TRUCKS AT CHICAGO.

During the Chicago National Automobile Show the new series models of United trucks were on exhibition at 1231 Wabash avenue. The new series includes models of one, two, 3½ and five-ton capacities, and deliveries will start during the first part of February. The prices have not been definitely fixed as yet, but will be approximately as follows: One-ton, \$1850; two-ton, \$2550; 3½-ton, \$3450; five-ton, \$4500. Bumper radiator guard, hub odometer and painting are included as standard equipment at no extra charge.

SOWERS WILL MARKET FULTON.

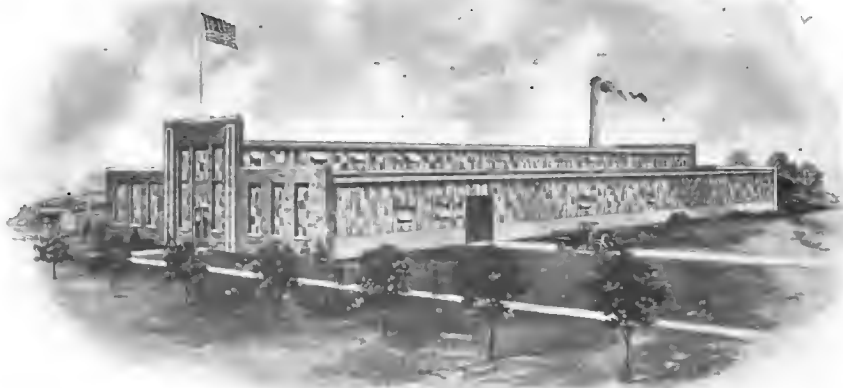
The entire New England territory for the Fulton trucks has been taken over by A. H. Sowers, treasurer of the Jackson Motor Car Co. of New England. He has already closed agencies for Fulton trucks at Worcester, Springfield, Brockton, Haverhill, Lawrence and Fall River.

BROOKLYN TRUCK SHOW.

The only exclusive motor truck show to be staged in a big city this year will be held in the Twenty-Third Regiment Armory, Brooklyn, N. Y., March 5-9. Preparations for the exhibition are being made on a larger scale than ever before.

GROCERS CHARGE DELIVERY.

As a means to induce customers to carry home small packages purchased at the grocers and markets and cut down unnecessary delivery costs, the grocers and market men of Milwaukee, Wis., are charging five cents for all deliveries.



The New Plant of the Muskegon Engine Co., Muskegon, Mich., Builder of Muskegon Trucks, in Which Production Was Recently Begun.



The MOTOR TRUCK

Devoted to Motor Driven Business Vehicles of all Classes

VOLUME IX
No. 2

FEBRUARY
1918

Trucks at the Great Boston Show

Exhibition Will Be the Largest Number of Makes —Vehicle Equipment Will Be a Distinct Feature

LARGER than ever before will be the truck department of the Boston Automobile Show, which will be opened in Mechanics' Hall, Boston, March 2, and will continue until the evening of March 9. This will be the 15th annual exhibition organized by the Boston Automobile Dealers' Association, Inc., the ninth show of the Boston Commercial Motor Vehicle Association, Inc., and the sixth year that the two associations have consolidated in one event. For the three previous years the truck shows were held the week following the passenger car exhibit.

The Boston Show has been since 1904 a national event. Each year the exhibition has had greater prestige and it is now practically an institution, anticipated with keen interest by hundreds of thousands of people, and attracting them to it in increasing numbers. Boston, by far the wealthiest city of its population in the country, and the commercial centre of a section of the country having more than 8,000,000 inhabitants, is the location of the show, but a majority of the visitors reside elsewhere, so the statement that it is a

New England exhibition is not only conservative, but is justified from every point of view.

The truck department of the show is limited to the basement of the building, the first floor being given over to passenger cars and the floor above to smaller exhibits. The truck section, however, will be the centre of interest for business men, for now power vehicles are known to be a necessity with practically every

commercial and industrial enterprise. As a matter of fact the truck department is, from the viewpoint of business anticipated, more important than any other, although not having equal area of floor space.

The Boston Show is open to the public for seven of eight successive days, but the preparations are continuous throughout the year. Applications for space are often made more than a year in advance of the exhibitions, and as preference is given those applying for renewals as against those who have not previously exhibited, the opportunities for obtaining increased area, or even any space, have decreased each year. The only other section in which trucks can be shown is the first floor, and



J. S. Hathaway, President, Boston Commercial Motor Vehicle Association.

space there can rarely be obtained. Only in the arrangement of the small spaces are changes of consequence made. This year the truck department has been a problem. The space demanded has largely exceeded what is available, and despite concessions by exhibitors who were themselves unable to obtain what was originally applied for, Manager Campbell has been compelled to deny a considerable number who were desirous of making display. The department, however, will be larger than ever in that there will be more makes of machines and a great number of completed vehicles and trucks. The arrangement will be very much the same as in previous years, though the spaces occupied by accessories and specialties will be smaller.

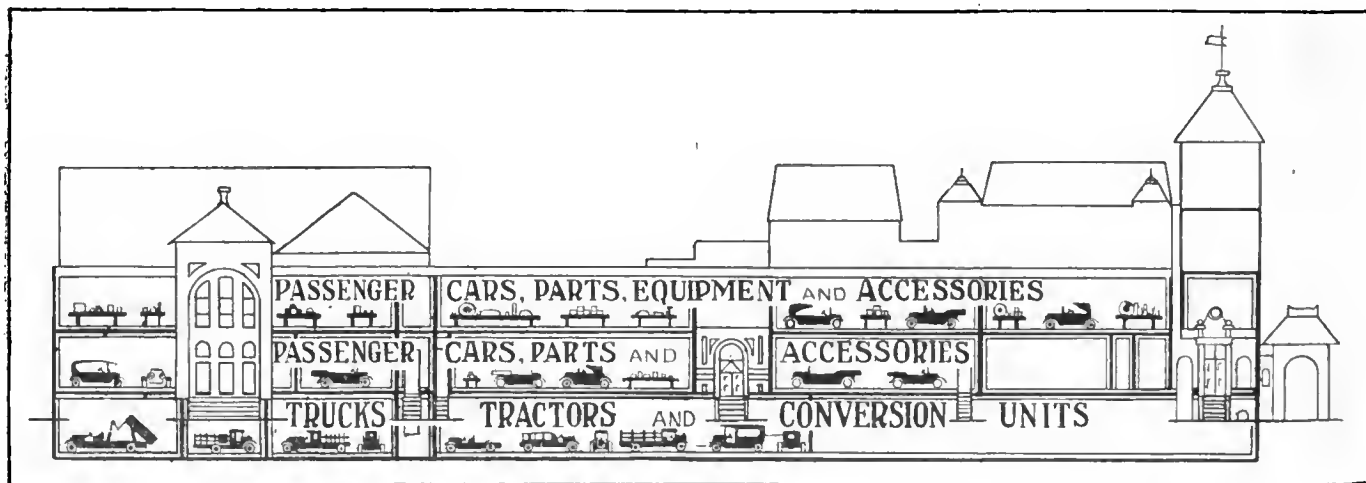
The decorations of the truck division of the show are not regarded as attraction for buyers, whose entire interest is in the machines. What is wanted is all the aisle area that is practical so that there will be the least congestion of visitors. The experience with the previous shows has been that the truck exhibitors

and unload rapidly, and no investment is judicious unless equipment can be utilized to the greatest degree.

Nothing Radical in Design.

The show will have nothing radical so far as trucks are concerned. Practically all vehicle builders have accepted the four-cylinder engine as a standard, although a few use six-cylinder units, and the engineers are divided so far as power transmission systems are concerned, worm shaft and wheel, internal gear, bevel gear, double reduction gear and chains and sprockets being all practical constructions. In these systems the greatest variance of design is found. Beyond this are lesser details, some of them important enough, but not given the same degree of attention as the power plant and the power transmission.

The truck buyer of today has a wide range of engineering from which to choose his equipment, but choice is not always made with the discrimination of the engineer. The buyer may not be well versed in mechanics, but he has considerable general informa-



Sketch Showing the Manner in Which Meehanes' Building Has Been Departmentalized by Manager Campbell, the Floors Being the Basement, First and Second, and the General Character of the Exhibits to Be Shown on Them.

must have sufficient room to show the machines from all angles. The men who are interested in buying desire to be as much apart from distracting influences as is possible, and care little for musical programmes or scenic effects. For these reasons cleanliness and pleasing colors are the main essentials of decorations.

All Well Known Makes to Exhibit.

The exhibitors will include practically all the makes that are familiar to those in the industry and trade. The exhibits will consist of completed chassis, as these are regarded as absolutely necessary by all truck builders and salesmen, but so far as possible the displays will be of specialized body equipment, especially those that have facilities that make for quick loading and unloading. There is keen realization that a great deal of the economy practical with power vehicles is what will minimize idle time. The man who has an extremely efficient organization and a carefully perfected system of operating cannot obtain results unless his vehicles are equipped to load

tion that he applies, and he has gathered facts that he believes are essential to any decision he may reach. But he buys differently than when selecting a passenger car.

The passenger car is desirable—it may even be a necessity in the minds of those who depend upon them for means of travel—but these needs are not comparable with those that impel business men to invest large sums in vehicle equipment to do their work, for without transportation industry would suspend and enormous values would be sacrificed. Power trucks are no longer regarded as experimental. They are known to be as dependable and as reliable as skilled engineering can make them. They have been proven in so many ways that there is no doubt existing in the minds of men as to service life and practical utility.

Knowledge of Quality Sells Trucks.

Years of knowledge of automobile vehicles have educated hundreds of thousands to mechanical construction and to the ordinary operating requirements,



J. W. Maguire, Vice President, Boston Commercial Motor Vehicle Association.

a very large number prefer to make use of what is produced by specialists who standardize designs and manufacture units that will afford at least satisfactory service.

Some of these specialists have large plants and corresponding production—in fact a number are larger from every viewpoint than many of the vehicle building concerns. The materials are the best obtainable and the products are designed, tested and observed by engineering experts. They are proven by service in the hands of innumerable owners and drivers and whatever degree of quality they are recognized as having is upon the basis of the experience in actual use.

The units are built with keen understanding of the service they must endure and the knowledge that failure from any cause other than accident will cause dissatisfaction and loss of reputation that



P. S. Antman, Director, Boston Commercial Motor Vehicle Association.

and the public generally has knowledge of the different types of construction units of which the majority of all machines are built. The manufacturers who build cars or trucks from raw materials are comparatively few. There are some in this class and there are excellent reasons why they prefer to use what has been developed purposely to meet their engineering requirements, but



J. H. MacAlman, Director, Boston Commercial Motor Vehicle Association.

will be extremely detrimental to the manufacturer and to the builders of vehicles and their selling organizations. The parts builders have quite as much at stake as others, and material loss can result in a comparatively short time. For these reasons the manufacturers have learned that not only must they produce what will have quality, but they must in-

form the public of all the facts that are needed to maintain the reputation that has been established.

Passenger cars are so generally owned and used that the people as a whole are much better informed concerning them. They have been educated by intensive publicity and by personal endeavor. They have, because their own pleasure and satisfaction were involved, acquired a great deal of general knowledge, but when such in-



Day Baker, Treasurer, Boston Commercial Motor Vehicle Association.

formation is applied to buying, operating and maintaining trucks, it is comparatively valueless. With the car expense is secondary, but with the truck it is the dominating factor, and this being so purchasing is regarded, as is with rare exceptions is all buying, as getting the greatest value for the least expenditure.

When close buying is concerned known quality is a very potent influence. That this is realized by truck manufacturers, that they understand the reliance of buyers on construction units and equipment produced by specialists is clearly established, for with few exceptions they specify the makes or trade names of those they use in all publicity and the sales organizations are educated to the same measures of

quality claimed by the makers of these parts. The object is to consistently present to buyers standards of mechanical and service values. Logically, this policy means concentration of selling endeavor on what is known to the people, and there is good judgment in constantly directing the attention of the public to the qualities claimed for the units and for the trucks that are constructed



L. B. Sanders, Director, Boston Commercial Motor Vehicle Association.

with them these standards are accepted.

Results from Practical Cooperation.

Unquestionably the expense of nation-wide publicity is large. It must be consistent and continuous, and only by cooperation of the manufacturers of the units and completed vehicles and their sales organization can results be obtained. This policy does not differ from those of other industries that sell production generally. There is no question that it is productive and advantageous, and the returns are in ratio to the magnitude of the publicity and the sales organizations, provided, of course, that the standards of quality are maintained.

The object of truck manufacturers generally is to make known to the people the qualities of the vehicles they build. This is the real purpose of exhibition, and this year for the first time the parts and unit manufacturers have joined with the builders of machines in joint exhibitions, the former making demonstrations of what they produce in other departments of the show, so that visitors can obtain whatever information they desire.

To illustrate the value of this method of show cooperation. The visitors to the show can see engines, clutches, transmission gearsets, universal joints, rear and front axles, springs, frames, jackshafts, radiators, wheels and other standard units, as well as varying forms of equipment, such as starting and lighting systems, ignition systems, fuel

C. E. Fay, Member, Boston Commercial Motor Vehicle Association.

supply systems, magnetos and carburetors, generally assembled and disassembled, and can observe demonstrations or obtain detail information of any character that may be desired. They can learn by observation and explanation what would not be obtainable from literature or illustrations. They can turn to vehicles built with these units and determine whether or not these will meet their requirements. They can make comparisons without prejudice and reach decisions that will be well founded and obviously more satisfactory.

No criticism can be made of this policy of cooperation and education of buyers to the qualities of design and construction. It is equitable to all and there are possibilities limited only by the numbers and the strength of each organization. The sales of passenger cars were for a considerable time more or less dependent upon construction, but numerous other factors regarded by buyers, especially design of body and equipment, had much weight in determination. Ob-

viously strength of construction is imperative in trucks. The machines must be worked hard to be productive and they must be so built that they will afford service with the least lost time and minimum maintenance expense. These are the fundamentals, and on them are founded all other reasons for buying, so that quality is to be considered above all else.

Show Organized by Dealers.

The Boston Commercial Motor Vehicle Association, Inc., is composed of 34 members, 32 of which represent different concerns, all of which save one are managers of branches or the agents of vehicle manufacturers. The membership consists of the representatives of 13 exclusive builders of trucks, 13 builders of trucks and passenger cars, one conversion unit manufacturer, and five other concerns that deal in trucks. The officers of the association are Josiah S. Hathaway, New England manager for the White Co., president; J. W. Maguire of the J. W. Maguire Co., vice president; Day Baker of the Day Baker Motor Truck Co., treasurer; P. S. Aultman of the Kelly-Springfield Motor Truck Co., J. H. MacAlman. C. P. Rockwell of the C. P. Rockwell Co., L. S. Sanders of the Oakland Motor Co. of New England, J. L. McKone of the Connell & McKone Co. and H. H. Halliday of the Mack Motor Truck Co., directors, and Chester I. Campbell, secretary.

One will understand that the members are concerned in making the most that is possible from the show and that nothing that will in any way contribute to its attractions or productiveness has been neglected, but the only limitation is the floor area of the building. Mechanics' Hall, while the largest exhibition building in Boston, which is arranged by Manager Campbell so that upwards of 105,000 square feet are available for exhibition purposes, is much too small. Experience has proven that overflow into adjacent buildings is not favored by the public, so that those exhibiting outside of the main structure are given but a small part of the attention directed to the displays in Mechanics' Hall, and rather than have exhibitors dissatisfied limitation to the one building was determined.

The exhibition will be opened at 8 o'clock the evening of March 2 and it will continue until 11. Each day of the following week it will be opened from 10 o'clock mornings to 11 o'clock evenings, and there will



George W. McBride, Member, Boston Commercial Motor Vehicle Association.

be the usual band and orchestra musical programmes each afternoon and evening. Wednesday, according to the custom of former years, will be "Society Day." While the features that may be entertaining to those interested in passenger cars will have but little attraction for those who are buying trucks, Manager Campbell, who has directed all of the exhibitions staged in Boston, promises that the show will be quite

the most interesting of any he has organized. Exhibitors in the truck department are extremely optimistic of the business that will be developed and they have made preparations to deal with the largest number of buyers that has ever invaded Mechanics' Hall. The majority of the exhibitors maintain that the principal limitation to truck buying will be getting machines East from the factories.

SOME TRUCK DEPARTMENT EXHIBITORS

ALTHOUGH slight changes are possible, the appended list of concerns that will exhibit trucks and truck chassis at the Boston Show is practically complete. The number of machines that will be shown by each cannot be given at the time of this writing, but Manager Chester I. Campbell, states that the total will exceed that of any preceding show, although the space is not larger. This has been possible by varying the arrangement of the stands and placing of the exhibits.

The exhibitors will go as much further as is necessary to serve buyers, for practically every one will have demonstrating machines outside of the hall, and there is reason to believe that the greater part of the demonstrating at the show will be with trucks instead of passenger cars, as in previous years. Concerns that were unable to obtain satisfactory space have made plans to show trucks at their sales rooms, and most of the machines will have special bodies.

One interesting feature of the truck exhibits will be the showing of bodies, for high grade equipment is absolutely essential to efficient haulage. Besides these a number of body builders will make display of special work that is believed to have merit. Of course there are hundreds of uses made of what are known as standard type bodies, and these will be shown with distinct object of showing the possibilities with decorations and finish.

Truck owners are practically unanimous in the opinion that a large value obtains from the appearance of their vehicles, and are willing to pay for high grade work because of the added attractiveness of the machines and the impression made upon the public. The exhibitors of vehicles and implements and units in this department number 60, of which 44 show gasoline trucks, one gasoline tractor, three electric trucks, one fire apparatus, one electric industrial truck, seven conversion units, one chassis adapter, one trailer, two farm tractors and one motorcycle. The list follows:

	Space
Acason trucks and chassis, Acason Motor Truck Co., Detroit, Mich.....	354-5
Amesbury Internal Gear, Jackson Motor Car Co., Boston.....	213-4
Atlantic trucks (electric) Day Baker Motor Truck Co., Boston.....	308-9-10
Atlas trucks, Signal Motor Truck Co. of New England, Boston, Mass.....	203
Autocar trucks and chassis, Autocar Sales and Service Co., Boston, Mass.....	316-17-20-21
Bethlehem trucks, C. S. Ransom, Inc., Boston, Mass.....	347-8-9
Brockway trucks and chassis, Brockway Motor Sales Co. of New England.....	209
Chevrolet trucks, Chevrolet Motors of New England, Inc.....	306

Clydesdale trucks, Oakland Motor Co. of New England.....	324-5
Columbia tractors and trailers, John L. Judd, Boston.....	225-232
Comdecar, Longford Co. of America, Cambridge, Mass.....	356-7
Couple-Gear, Couple Gear Freight Wheel Co., Grand Rapids, Mich.....	307
Cunningham trucks, James Cunningham Son & Co., Boston.....	311-12
Day-Elder trucks, Day-Elder Motors Corp., Boston.....	206-7
Denby trucks, Hurley-Kimball Co., Boston.....	351-2-3
Dodge trucks, Henshaw Motor Co., Boston.....	225
Diamond T trucks, Eastern Motor Sales Co., Boston.....	303-4
Duplex trucks, Linscott Motor Co., Boston.....	329-30-1-2
Ford trucks, Ford Motor Co., Boston.....	350
F-W-D trucks, Geo. W. McBride & Co., Inc., Boston.....	301-2
Federal trucks, Federal Motor Truck Co., Boston.....	315-19
Fulton trucks, Jackson Motor Car Co., Boston.....	213-4
Guaranty trucks, Guaranty Motors Co., Cambridge, Mass.....	239
GMC trucks, General Motors Truck Co., Boston.....	217-8-9-20-1
G-V trucks, General Vehicle Co., Inc., Boston.....	323
G-V Mercedes, General Vehicle Co., Inc., Boston.....	323
Hercules trucks, Stegeman Six Truck Co. of New York.....	239
Hunt Industrial trucks, Day Baker Motor Truck Co., Boston.....	308-9-10
Hurlburt trucks, Day Baker Motor Truck Co., Boston.....	308-9-10
Indiana trucks, Indiana Truck Corp., Boston.....	211-2
IHC trucks, International Harvester Co. of America, Boston.....	215-6
Kelly-Springfield trucks, Kelly-Springfield Motor Truck Co., Boston.....	313-4
Longford Units, Longford Co. of America, Cambridge, Mass.....	356-7
Maxwell trucks, Charles E. Fay Co., Boston.....	334-5-44-5
Mack trucks, Mack Motor Truck Co., Boston.....	240-1
Maxim fire apparatus, Maxim Motor Co., Middleboro, Mass.....	242-3-4
Maxter trucks, Eastern Motor Sales Co., Boston.....	203-4
Nash trucks, C. P. Rockwell, Inc., Boston.....	327-8
Netco trucks, New England Truck Co., Fitchburg, Mass.....	305
Packard trucks, Packard Motor Car Co. of Boston.....	336-7-8-9-40-1-2-3
Pierce-Arrow trucks, J. W. Maguire Co., Boston.....	245-6-7-8-9-50
Phenix Unit, George W. McBride & Co., Inc., Boston.....	301-2
Rainier trucks, New England Velle Co., Boston.....	326
Reo trucks, Linscott Motor Co., Boston.....	329-30-1-2
Republic trucks, Republic Truck Co. of Boston.....	223-233-4
Sanford trucks, Sanford Motor Truck Co., Syracuse, N. Y.....	202a
Signal trucks, Signal Motor Truck Co. of New England, Boston.....	203
Smith Form-a-Truck units, John L. Judd, Boston.....	225-32
Sterling trucks, Sterling Motor Truck Co. of Boston.....	201
Stewart trucks, H. Ross Maddocks Co., Boston.....	318-9-20-1-2
Tonford Units, Eastern Motor Sales Co., Boston.....	303-4
Troy trailers, Linscott Motor Co., Boston.....	329-30-1-2
Truxton Units, C. S. Ransom, Inc., Boston.....	347-8-9
Velle trucks, New England Velle Co., Boston.....	326
Vim trucks, Merchants Motors, Inc., Boston.....	236-300
White trucks, White Co., Boston.....	251-2-3-226-7-8-9-30-1
Will Holl-Ton units, O'Lalor Auto Co., Boston.....	200
Wilson trucks, J. C. Wilson Co., Detroit, Mich.....	237-8
Avery tractors, Brackett, Shaw & Lunt Co., Boston.....	346
Beeman Garden tractors, Brackett, Shaw & Lunt Co., Boston.....	346
Harley-Davidson motorcycles, Sanford Motor Truck Co.....	202a

Other exhibitors in the truck department, the nature of whose displays have not been stated, are:

George M. Proctor, Boston.....	208
Virgil White, West Ossipee, N. H.....	210

Among other exhibitors the Eastern Motor Sales Co., Boston, will show Case farm tractors at spaces 303-4; L. M. Cotton, Inc., will show a large number of special bodies at spaces 359-62 inclusive; the Sewell Cushion Wheel Co. will exhibit at space 222; the Springfield Commercial Body Co. at space 346, and the Smith Wheel, Inc., at 204-5.



Mack 7 1/2-Ton Truck with Platform Body and Cradles, Used for Hauling Heavy Logs by the Walker Lumber Co., Salisbury, N. C.

Big Profit Logging With Trucks

North Carolina Lumber Co., Saves 71.84 Per Cent. of Haulage Cost with Mules.

HAULING logs for 28.14 per cent. of the cost for similar work done with animals is the economy obtained by the Walker Lumber Co., a concern at Salisbury, N. C., which must transport the timber from the forests where it is cut to mills where it is manufactured into sizes adaptable for construction purposes. The company operates on a considerable scale and the mill must be permanently located, so that as the timber is cut the distance that it must be hauled has constantly increased. There are those who might assume that portable mills would be more economical, but were the logs milled the timber would have to be transported to the railroad for shipment. Viewed from any aspect there is a long haul involved, and the location of the mill at a railroad has advantages that more than offset those to be afforded by portable plants that could be moved with the cutting.

The Walker company for years operated with animals and found what has been a common experience with all lum-

bering concerns, that as there are no roads and the heavy logs must be drawn over paths in the comparatively soft soil, the work that is practically possible with them is slow and very costly because of the increased cost of labor and animal maintenance. The timber is cut with regard for its production of lumber and no matter where it is it must be rolled or drawn until it can be loaded on carts, and, of course, handling is hard and slow work at best. Some of the larger lumbering concerns operate with small railroads that can be located and extended through the cuttings, but these are seldom used where the hauls are considerable distances.

The Walker company's timber is cut from nine to 10 miles from the mill and practically all of the haulage is over roads that are in use the year round, but they are rough and but little work is done on them, for all the expense of maintenance must be borne by the company. As the transportation cost began to increase with the progress of the

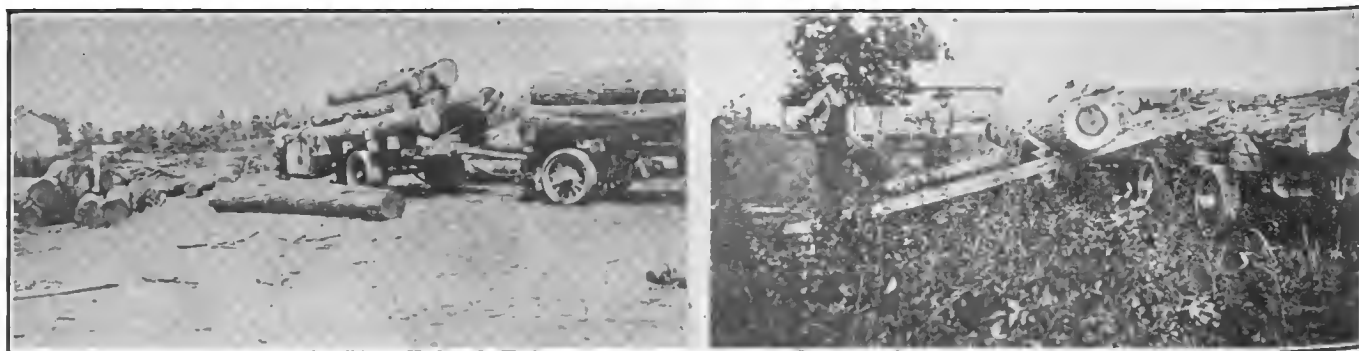
European war and the demand for timber improved the economies obtainable from trucks was investigated.

The company purchased a Mack 7 1/2-ton truck and a five-ton Troy trailer for experimental service, intending to use them doing the same work as animals, and with this object determined a fairly accurate record of the work and the cost of haulage with each equipment was kept. Experience proved that the truck could carry a full load and haul a fully loaded trailer, and could not only be worked over the soft and rough ground, but could be handled more advantageously than teams where the ground was reasonably clear of stumps.

Much of the timber cut is hard wood, heavy and difficult to handle, so that the loading of the truck and the trailer must be done with skids. With derricks considerable time could be saved, and were another trailer used, that could be loaded while the truck was driven between the cutting and the mill, there would be a decided saving. As it is the truck must stand while it and the trailer are being loaded and unloaded, so that a considerable time that might be made productive is now an expense. The same method of loading is followed with the animal carts, but the time of these is seemingly not so valuable.

Operating on cutting that required haulage of the timber 12 miles and returning with small or no loads, the truck and the trailer could make three round trips, with a total mileage of 72, and deliver as many logs as could be hauled with 15 teams. This meant that in this work the power outfit saved the labor necessary to operating 15 teams, or 30 animals, as well as the labor, and the actual cost of operating was approximately 25 per cent. of the expense of using horses. One will note that the loading and unloading was quickly done to make the stated mileage, which will compare very favorably with what is ordinarily made with a truck of this size on good roads and with less bulky and easier handled freight.

The statement is made by the company that the truck will haul as many feet of logs where the distance from the cutting to the mill is from nine to 10 miles as 12 teams of horses, that the cost will be less than a third of the expense of animals. This is substantiated by a statement of work done during



Logging with Power Trucks: At Left, Trailer and Tractor Hauling a Load of Logs Into the Yard of the Walker Lumber Co.'s Mill; at Right Loading the Trailer with Heavy Logs with Skids.

June, 1917, making comparison of the service practical with the truck without a trailer and 10 teams. During that month 10 teams in 22½ days hauled 79,891 feet of logs at a cost of \$889.50, or \$11.12 a 1000 feet. The Mack truck worked 23 days and hauled 91,200 feet of logs at a cost of \$284.54, or \$3.13 a 1000 feet.

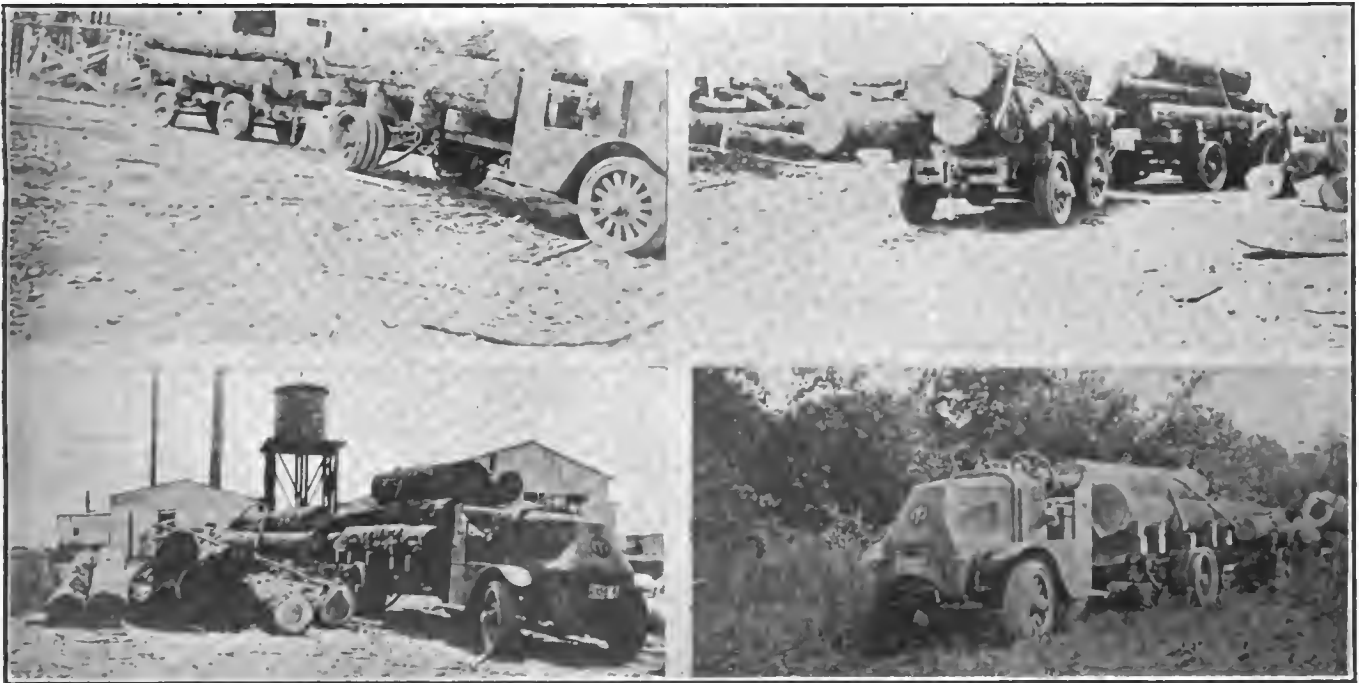
The timber was hauled from nine to 10 miles, and the animals made one round trip of from 18 to 20 miles a day, and the average load for a team was 355 feet of lumber, or 4250 pounds. The teams hauled an average of 2½ tons to a load. The truck made four round trips on the same work and the average load for the machine was 1140 feet, or 13,680 pounds, or 680 pounds in excess of the load rating. A load of 1140 feet of logs would equal about 4500 feet of lumber.

Making comparison of the cost of operating the truck and the 10 teams one

during the month, and the seemingly low expense is accounted for by the fact that labor, storage and all other charges were considerably lower than in the North. With men experienced in the care of machinery and tools always available the maintenance charge was somewhat under what might be expected in other and less favorable conditions.

From any angle the experience of the lumber company is unusual. With added experience the work could be easier done and the operating expense could be somewhat lessened. In connection with the comparison of expense, statement should be made that the cost of animal upkeep in the South is undoubtedly less than in the North and that \$88.95 for a team of horses or mules and the labor of a driver for 22½ days is relatively small. The same service could not probably be obtained in the North under \$5 a day, and there is every reason to believe that the cost would be more. The

The new production schedule includes the manufacture of a one-ton truck to sell for less than \$1400, which will have an engine with bore of 3½ inches and stroke of five inches, with Dyneto starting and lighting and Delco ignition. Between 600 and 750 of these will be produced for 1918. Pneumatic tires will be fitted in front. This model will use gasoline only as fuel, but other Manly models are designed to operate on kerosene or gasoline. The two and 2½-ton Manly models will be continued, but the three-ton will be dropped and a 3½-ton model manufactured in its place. Three sizes of tractors of the semi-trailer type will also be built, three, five and seven-ton models. The three-ton model will operate on gasoline only, but the heavier types will be adapted for either gasoline or kerosene. Manly construction will be used throughout the trailers except for a shorter wheelbase and heavier frame, and springs and a fifth wheel of



Working at Lumbering with Tractors: Upper Left, Mack Tractor and Trailer Coming Down a Steep Descent with a Heavy Load; Upper Right, Mack Tractor Climbing a Steep Grade with a Trailer and Load; Lower Left, Handling the Tractor and the Trailer in the Mill Yard; Lower Right, Hauling a Full Load Over Unbroken Ground to a Road.

learns that the cost of the former was 28.14 per cent. of the expense of the latter, and actual saving was 71.86 per cent.

One does not realize the full significance of this economy until brief analysis is made of the saving by month and year. Were a second truck purchased to take the place of the 10 teams (the machine would do considerably more than three times as much work), and there was a monthly saving of \$603.96, which the statement above shows was made, the annual total would be \$7247.52, or considerably in excess of the cost of the truck, and approximating the cost of the machine and the trailer. Basing estimate on this statement the Mack truck, exclusive of the trailer, more than earned its cost the first year that it was in service.

The operating cost of the truck was \$12.43 a day for each day it was worked

safest basis is the comparison made by the lumber company, which has abundant knowledge and experience with both classes of haulage.

O'CONNELL-MANLY TRUCK CO.

The Manly Motor Corporation, Waukegan, Ill., has been reorganized as the O'Connell-Manly Truck Co., the O'Connell part of the firm representing the interest acquired in the company by William L. O'Connell, former Chicago Commissioner of Public Works, treasurer of Cook County, Ill., and chairman of the Illinois State Public Utilities Commission under Governor Edward F. Dunne. E. J. Manly remains as president of the company and H. P. Manly as secretary. Edwin Page, the former treasurer, has been elected vice president and Mr. O'Connell becomes treasurer.

shock absorbing type will be fitted.

Manufacturing space of approximately 100,000 square feet of floor space is now available at the plant, and supplies of materials and parts are now on hand to keep the factory running well into the spring without replenishing.

WOUNDED SOLDIERS' TRANSPORT.

The Wounded Soldiers' Transport, organized in Boston, for the purpose of removing wounded soldiers from transports to the hospitals, has been tendered the use of 30 trucks owned by the R. H. White Co., C. E. Hovey Co., Jordan, Marsh Co. and William Fillene Sons' Co. These trucks are pneumatic tired and when occasion requires will be used in addition to the many cars of the men and women who formed the organization.

DEFIANCE 3000-POUND TRUCKS



The First Defiance Truck to Reach New York City, Which Was Driven Overland from Defiance, O., Arriving Just Before the Annual Automobile Show.

PRODUCTION of a single standardized type in large numbers is the plan of Turnbull Motor Truck and Wagon Co., with factory at Defiance, O., and sales department at Fostoria, O., which is now building commercially a 3000 pounds load capacity truck that bears the trade name Defiance. The company acquired the Turnbull Wagon Co., a concern that has operated for more than 41 years at Defiance, and which has a world-wide reputation for building high grade wagons and carts, and after reorganization that added capital to make the resources approximately \$1,000,000, entered the power vehicle industry with the name stated above. The intention was originally to have the trade name that of the company, but later Defiance was decided on as better identifying the truck with the city where it is built and obviating any possibility of confusion because of the original company's long established prestige with wagon building.

The president and general manager of the company is W. O. Allen, general manager of the Allen Motor Co., builder

of passenger cars, who has been prominent for a number of years in the automobile vehicle industry, and who has been extremely successful. The plant at Defiance is large, has excellent facilities for production of high grade machines and is extremely well equipped, and the organization developed by Mr. Allen is claimed to be exceptionally efficient.

First Truck to a Standard Design.

The plan of the company is eventually to produce a series of trucks of sizes to meet practically all demands for haulage, but this will not be consummated for a considerable period. The purpose is to have a standardized design which will be followed through the series, the difference in the machines being merely dimensions of units and parts, which will simplify production and service and will obviate what is practically necessary duplication with changes of design of any given size. The company realized that standardization was not possible without positive knowledge of the practicality and service value of the design, and not until after extended use and perfection were the engineering de-

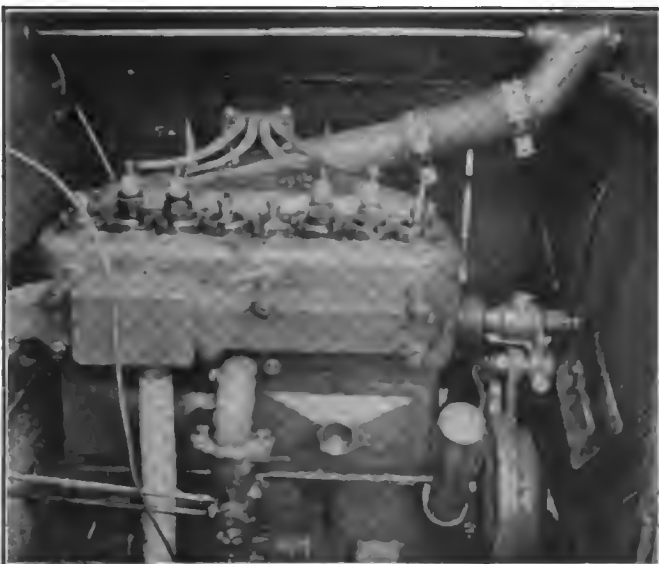
tails of the Defiance truck determined.

The company was aware that much depended upon the quality of the first trucks built, and much care was taken to have these machines all that discriminating engineers could demand. The Defiance company has not departed from well known and clearly established practice. It has adopted a design that is extremely simplified and unusually accessible for adjustment or work, so that the machine can be maintained with minimum labor. The power plant is conventional from every viewpoint, but it largely exceeds its power rating with comparatively small consumption of fuel and lubricant, and exceptional efficiency is claimed for it. The construction as a whole has been carefully thought out, the simplified power transmission system and the internal gear driven axle applying a large ratio of the engine output in useful work at the road wheels.

Four-Cylinder Engine.

The engine is a four-cylinder, four-cycle, water cooled, vertical L head type, constructed by the Allen Motor Co., which is developed and designed especially for heavy duty. The cylinders have bore of $3\frac{1}{4}$ inches and stroke of five inches, and the power rating is 22.50 by the S. A. E. formula, but claim is made that it will produce approximately 30 horsepower, which is more than ample for any service in which a 3000-pound machine could be practically worked. The cylinders are cast en bloc and the water jacket head is detachable, the water chamber having unusual capacity, so that there is no probability of the engine heating excessively no matter what the work.

The engine case is divided, the upper section carrying the main bearings for the crankshaft and the camshaft, and the lower part is the oil reservoir and the base of the crank chamber. The crankshaft is exceptionally heavy and the re-



The Allen Engine of the Unit Power Plant, Which Is Rated at 22.5 Horsepower and Will Develop Upwards of 30.



One of the Conveniences of the Defiance Truck, a Tool Box in the Side of the Driver's Seat That Is Instantly Available.

ciprocating members are unusually light, and as great care is taken to obtain accurate balance the vibratory stresses of the engine are reduced to minimum. The engine is lubricated by a combination pressure and splash system, the oil being filtered before it is drawn from a sump in the reservoir and carried to the main bearings and timing gearset. The cylinders, pistons, connecting rod, camshaft and wristpin bearings, the cams and valve mechanism are lubricated by the splash of the connecting rods in the overflow of oil in the base of the crank chamber.

Ample Cooling System.

The engine is cooled by a thermosyphon circulation of water through the large water jacket and a truck type Perflex radiator, this having a core of honeycomb construction with cast top and bottom tanks, that is so suspended that it is not subjected to the stresses of chassis distortion. Radiation is insured by a fan carried on ball bearings on an adjustable bracket on the forward end of the cylinder block that is driven by a flat belt from a pulley on an extension of the magneto shaft.

The ignition current is supplied by an Eisemann high-tension magneto, a water proof type. The carburetor is a model M-1 Stromberg, having a hot air connection with the exhaust manifold and a dash air control for starting. The speed of the truck is regulated by a Monarch governor which can be locked after setting and cannot be changed without the knowledge of the owner.

The clutch is a Borg & Beck heavy duty three-plate dry disc type that requires practically no attention, and the transmission gearset is a Grant-Lees construction, having three forward speed ratios and reverse. The gearset is heavily built, the shafts and gears being constructed of $3\frac{1}{2}$ per cent. nickel steel, both the main and countershafts being mounted on SKF double-row, self-aligning bearings. The clutch and the gearset are assembled with the engine in a unit power plant that is carried on three points, the forward end of the unit being supported by a trunnion and the sides by arms bolted to the side mem-



A Defiance 3000-Pound Truck Equipped with a Full Cab and a Platform Body and Rack Sides, Suited for Carrying Bulky Loads.

bers of the chassis frame.

Torbensen Drive Rear Axle.

The drive is by a large tubular shaft $2\frac{1}{4}$ inches diameter, with an enclosed Arvac universal joint at either end to the pinion shaft of the Torbensen drive internal gear rear axle. This is constructed with an expanded eye in the centre of the dead axle, behind which is the central section of the jackshaft housing, that is bolted to the "eye," the pinion shaft extending forward. The wheel spindles of the dead axle are nickel steel.

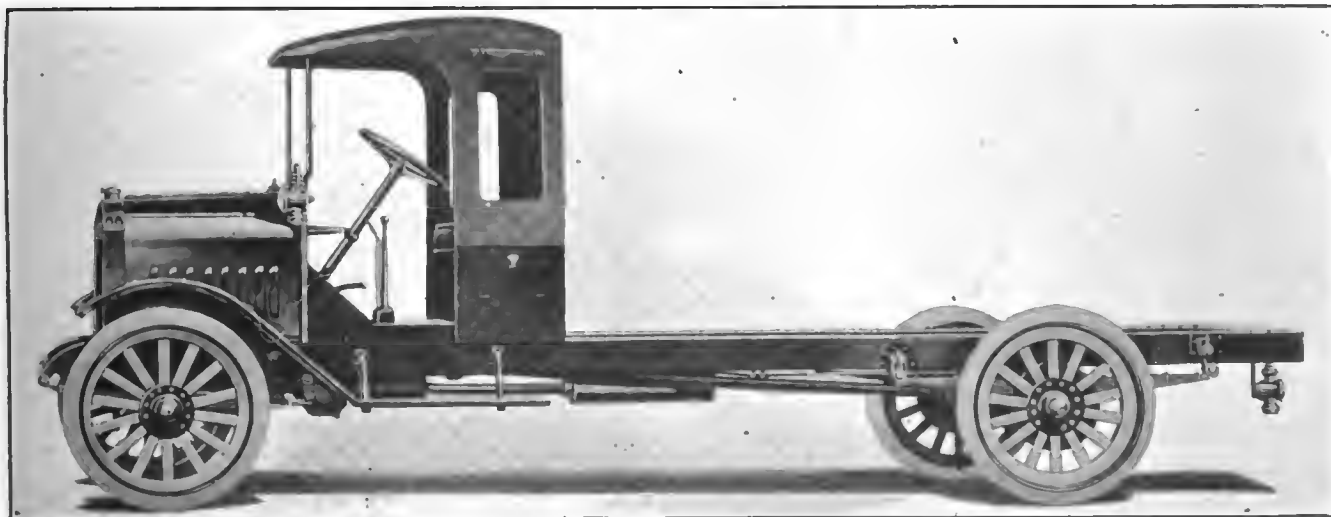
On the ends of the dead axle are two large flanges, which support the bearings on which the ends of the driving shafts are mounted, and pinions on these shafts mesh with the internal gears inside the steel drums on the wheels. The axle flanges also support the brake shafts and are fitted with packing rings that contact with the brake drums, fully enclosing the pinions, gears and brake shoes. The differential gearset is comparatively small and the driving pinion is large, the principal reduction being at the pinions and internal gears.

All the shafts and gears are highest quality alloy steel and the differential gear-

set and the wheels are mounted on heavy roller bearings. The differential is lubricated by an oil bath and the pinions and internal gears are packed with grease and seldom require attention. The front axle is a heavy steel drop forging, with large spindles, equipped with Timken bearings, and the spindles of the steering knuckles are fitted with ball thrust bearings, which insure against wear and makes for easy steering. The steering linkage is large and there are means for adjustment.

Frame and Running Gear.

The frame is constructed of heavy pressed steel channel section $5\frac{1}{2}$ inches width with wide webs. The frame is 199 inches length and 34 inches width back of the cab, being "necked" at the forward end to facilitate steering and short turns. The frame is built with four sturdy cross members and large gussets and it is further stiffened by the arms supporting the engine and the heavy brake shafts. The frame is mounted on springs that are a semi-elliptic type, the front set being 42 inches long and $2\frac{1}{4}$ inches wide and the rear set 54 inches long and $2\frac{1}{2}$ inches wide. The rear springs have but little arc, however, and



Complete Defiance Chassis With Cab. The Straight Line of the Driving Shaft and the Flat Rear Springs Are Features of the Construction. The Drive Is Internal Gear.

are practically flat when carrying a load. The springs are the best obtainable and the bolts are one inch diameter, hardened and ground. The spring eyes are bushed with bronze and the eyes and shackles are lubricated with wick oilers that insure continuous lubrication, so long as the oilers are replenished occasionally. There are no radius or torque rods, the propelling and braking stresses being taken by the springs. When moving the driving thrust of the rear springs is practically in a straight line and there is but little angularity of the shaft and very little loss of power in the universal joints.

The axles are equipped with heavy artillery type wood wheels, each having 14 spokes, those of the front wheels being 1 3/4 inches diameter and those of the rear wheels two inches diameter. The wheels are shod with solid tires, the forward set being 34 by 3 1/2 inches and the rear set 34 by five inches. The tires are a pressed on type. The wheelbase is 135 inches and the tread 56 inches, there being but one chassis length.

Steering Gear and Control.

The steering gear is located at the left side of the chassis and is a heavy worm and full gear type, with 18-inch hand wheel, and built with means for adjusting to compensate for wear, so that there may be no lost motion and no excessive stress upon the wheels, steering gear or chassis. The steering linkage is unusually heavy and this can be adjusted as wear develops. The control is by foot pedals that actuate the clutch and service brake, and throttle and ignition control levers on the hand wheel. The gear shifting and emergency brake levers are located on a tower over the transmission gearset housing in the centre of the footboard. The service brake is an external contracting type and the

emergency brake has internal expanding shoes, which operate on and within steel drums 15 inches diameter on the rear wheels. The brakes are claimed to be very efficient and to have more than ample power. They are very accessible and can be quickly and conveniently adjusted as worn. The emergency brake, being enclosed in the brake drum and protected from abrasives, will wear very slowly in extremely hard service.

The gasoline tank, which has 20 gallons capacity, is located under the driver's seat and mounted on a three-point flexible support so that it is protected against stresses and possible damage resulting from chassis distortion. From this tank the fuel is supplied by gravity. A good deal of attention has been directed toward insuring chassis endurance. All parts and units have very large factors of safety and the spring hangers, for instance, are much over size, so that there will be as much insurance as is possible against overloading or work on rough roads or from contact with obstructions.

Other Details of Construction.

The length of body that can be installed without overhanging the chassis frame is 116 inches, the rear end of the frame being 44 inches back of the rear axle. The chassis are equipped with driver's seat, front fenders, running boards, oil dash and tail lamps, odometer, horn, tool kit, tool box and jack. The chassis sells for \$1695 f. o. b. Defiance. The company produces a number of standard types of bodies in its own specialized body or wagon building department, these covering a considerably wider range than is usually available with truck builders. The experience of the company building bodies is not only broad, but it has the facilities and the resources for producing exceptional

work at comparatively low prices. The company will also undertake to build anything in the form of a body to specification. The trucks are sold with the standard warranty of the National Automobile Chamber of Commerce.

Just before the New York automobile show a Defiance truck was driven from Defiance to New York City by the way of Cleveland, Erie, Pa., Buffalo, Rochester, Syracuse, Utica, Schenectady and Albany by F. S. Rockwell, assistant sales manager of the company. The truck carried a load to its full rated capacity and while comparatively fast time was made the mileage cost of operating it was surprisingly small. The machine has abundant power, though some extremely bad roads were traversed.

A considerable part of the plant of the company is now working on a large contract to build wagons for army service, and this will for a while limit production of trucks, but the company's plan is to build 10,000 machines a year in two or three years' time. Meantime a selling organization is being developed throughout the country that is to be directed aggressively to distributing Defiance trucks.

HEAVYWEIGHT TRUCK SALESMEN.

At a sales conference at Chicago Robert S. Stewart, vice president of the United States Motor Truck Co., Sales Manager Forrest J. Alvin and two salesmen, P. D. Sampson, covering Ohio, West Virginia and Indiana, and W. B. Cochrane, western sales manager, learned that they measured exactly a half ton in averdupois, weighing respectively 220, 270, 270 and 240 pounds, and collectively they are maintained to be the champion heavy duty quartette of salesmen of the industry.

W. B. Cochrane, with headquarters at San Francisco, J. G. Berner, with offices in the Candler building, 220 West 42nd street, New York City, and H. M. Ross, stationed at Chicago, are recent additions to the United States sales organization. Mr. Cochrane, who has been identified with the industry since 1899, and associated with the White, Republic, Federal and International companies, was branch manager for the General Motors Truck Co. at San Francisco. Mr. Berner will supervise sales in New England and New York state and Mr. Ross will cover Illinois and adjacent states. Each will have a staff of assistants.

REO TRUCK PRICES ADVANCED.

The Reo Motor Car Co., Lansing, Mich., has announced a new price schedule for Reo trucks. The model F 1/4-ton has been advanced \$50 to \$1100, while the model J two-ton truck remains at \$1800. Model F with express body is priced at \$1175 and Model J with stake body at \$1950.

Tool designers, tool makers, die makers and other additional hands are being hired by the Maxwell Motor Co. to handle the work necessitated by its government contracts.



A Half-Ton of Truck Salesmen: This Heavy Duty Quartette Consists of Sales Manager Forrest J. Alvin, Vice President Robert S. Stewart, Western Sales Manager W. B. Cochrane and District Sales Manager P. D. Sampson of the United States Motor Truck Co.

MINERVA TRUCK AND TRACTOR ENGINES

EXTREME efficiency and large economy are two of the qualities claimed for the engine now being produced by the Minerva Engine Co., Cleveland, O., a concern that recently entered the industry, which has ample resources and exceptional facilities for manufacturing. The company has been organized a considerable period, but its activities have been the determination of a design and construction that will insure the production of a superior product.

Following a period of development and experimentation, the company decided to build for the present, at least, a single size and will concentrate on this. The design, however, is regarded as a standard, and the other engines to be built later will differ principally in dimensions of parts. The number that will constitute the series will depend upon circumstances. The size that is now manufactured is what will meet the greatest demand. The engines are what would be required for trucks and tractors of moderate ratings, and while they might be used for larger machines by greater gear reduction, this extreme is not comprehended by the designer or the engineers of the company.

The Minerva engine is designed specially for truck and tractor construction and it is recommended for no other service, although it may serve admirably for some classes of marine work. The design is not radical. To the contrary it is extremely conventional, but claim is made that it is a combination of well established engineering essentials that insure large economies and efficiency, as well as endurance, that are not found in any other design. Simplification has been sought with great care and the assembly is with the object of enclosing all working parts. All are exceeding accessible and while protected against abrasive action, minimum labor is necessary to afford attention for adjustment and maintenance. All contacting surfaces in motion are unusually large in area and provision has been made to have these lubricated at all times.

The engine has been designed for hard service and the work that must be done by trucks and tractors has been studied to obtain all desirable qualities and to obviate conditions that might be expected under heavy loads and constant use. The engine is a four-cylinder, four-cycle, water cooled, L head type, with bore of four inches and stroke of $5\frac{1}{2}$ inches, with a rating of 25.60 by the S. A. E. formula. The engine will, however, develop considerably more than this, and can conservatively be rated at more than 30 horsepower. The piston displacement is 276 cubic inches.

Water Jacket for Entire Cylinder.

The cylinder units are cast in pairs with the water jacket integral, and the jacket is unconventional in that the water chambers extend the full length of the cylinder, so that the walls are cooled

below the skirts of the pistons when they are at bottom centre. The combustion chambers are in the detachable heads, which are also fully jacketed, and the valve seats are unusually well cooled. The construction is such that the water chambers can be thoroughly cleared, so as to obtain perfectly free circulation.

The units and heads are designed to facilitate the machining processes, and assembling and disassembling, to clean the pistons and cylinders, can be done with minimum labor and in comparatively short time. The cylinders are the L head type, with the valves at the right side. The water outlet manifolds are in the centres of the unit heads and the water inlet manifold is connected at the bases of the units, under the valves, where incoming circulation will have the most effective reduction of temperature.

Crank Case an Iron Casting.

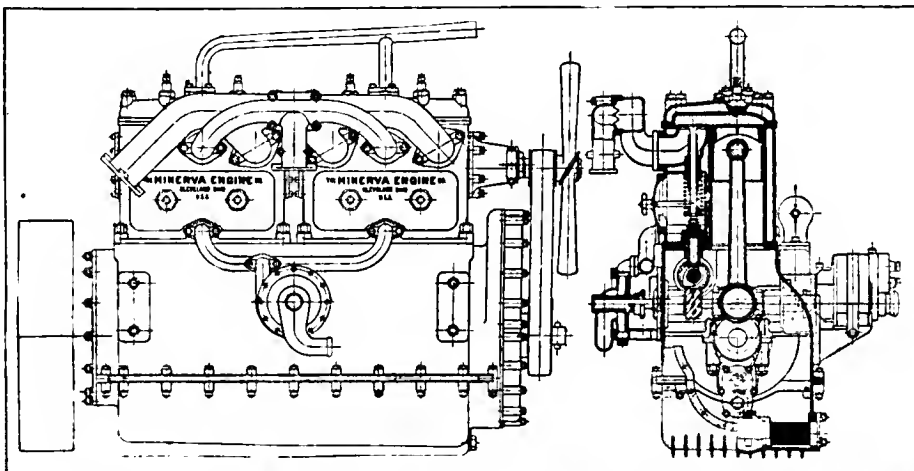
The crank case is a gray iron casting in two sections, the upper section being very deep, the division line being considerably lower than the centres of the

any tractor or truck frame. The lower section of the crank case is ribbed longitudinally externally, this making for greater strength and affording a much larger radiating surface to cool the oil than is obtainable with any other construction.

The pistons are a gray cast iron and are ribbed to obtain increased strength, and are so designed that there is a uniformity of thickness of the metal exposed to flame in the cylinders, so there will be no hot spots. The pistons are channeled for three packing rings, fitted between the wristpin and the top. Much care is taken in fitting the rings to obtain accuracy and uniform compression. All machining processes have been given careful attention.

Crankshaft and Camshaft Details.

The crankshaft is drop forged from a special alloy steel with the flywheel flange and flanges at either side of the centre journal to take end thrust integral. With this construction the shaft can elongate without stress upon the



Drawings of Side Elevation and Transverse Section of a Minerva Engine Seen from the Front, Showing the General Details of Design and Construction.

main or crankshaft bearings. There are forward and rear extensions, in both of which the crankshaft bearings are centred, and the forward extension is the housing for the timing gearset, being covered with a large plate retained by a series of cap screws. A rear cover plate, through which the extension of the crankshaft is centred, is retained in a similar manner.

The lower section of the crank case serves as an oil reservoir, and this is bolted to the upper section. The construction is such that the crankshaft and connecting rod bearings are easily accessible through large hand holes that are covered with plates that may be quickly removed.

The upper section is cast with a heavy central transverse vertical web and ribs from the front and rear crankshaft bearings, affording extremely rigid support for the bearings. The ribs extend considerably below the centre line of the crank case. Heavy pads for the supporting arms are machined at the front and rear ends of the crank case, so that the engine can be easily mounted in almost

end bearings, and the flywheel flange serves as a baffle plate to prevent oil leakage. The shaft is heat treated and carefully ground to dimensions. The connecting rods are drop forged steel I sections having large caps that are retained with four nickel steel bolts each. The camshaft is a special alloy steel drop forging, formed with the cams integral, and because of the unusual use made of it the shaft is mounted on four journals of liberal proportions.

The camshaft is first rough machined, then the cams and the journals are ground to size. The shaft is unusually heavy and designed to have extreme endurance. On this shaft, between the two centre bearings, is cut a helical gear integral with the shaft. The crankshaft and the camshaft are mounted on large babbitt bearings. The crankshaft and the connecting rod bearings, the latter also babbitt, are mounted in bronze cages and these are adjustable with laminated shims. The adjustments may be made by removal of the inspection plates of the crank case without removing the lower section of the case. The wrist-

pins are steel tube secured in hoses in the pistons and the connecting rods oscillate on these on bronze bushings of ample size.

The Pump and Magneto Drive.

The timing gearset is a spur gear type that is driven by the crankshaft in the usual manner. The camshaft is mounted on four bearings and at right angles to this shaft, carried on two large plain bearings, is a cross shaft that is on the centre line between the two cylinders. On this shaft is a helical bronze gear that meshes with the steel helical gear of the camshaft. The ends of the cross shaft are extended beyond the bearings, the right driving the water pump and the left the magneto, the magneto being connected with a flexible coupling. A ball thrust bearing takes the thrust of the cross shaft.

With this construction maximum accessibility is obtained, as either the water pump or the magneto can be removed quickly without dismantling or removing the other. The water pump is a centrifugal type, the impeller being mounted on a large diameter shaft carried on self lubricating bearings. The pump is so designed that the stuffing box is very accessible and can be repacked without dismantling the pump. As will be noted from the drawing the water pump is offset sufficiently so that the inlet manifold, which connects with the centres of the bases of the cylinder units, has good clearance. The pump assembly is clean and extremely simple.

The valves are large diameter and are the usual poppet type, with port seats having an angle of 45 degrees. The clearance is sufficient to insure complete inhaust and exhaust and consequent high engine efficiency. The valves operate in long renewable guides and are fitted with the usual helical springs. The valves are actuated by mushroom tappets carried in guides and they are fitted with adjusting screws and lock nuts. The entire mechanism is enclosed with cover plates secured by finger nuts.

Lubricating and Cooling Systems.

The engine is lubricated by a high

pressure system. The oil is carried in the reservoir and there is a sump and a suction chamber surrounded by a filtering screen. The oil is drawn from the reservoir by a very efficient gear type pump that is in a housing cast integral with the front bearing cap that is driven by a spur gear that meshes with a gear on the crankshaft, the pump being driven slightly faster than engine speed. The oil enters the crankshaft through the front bearing and is distributed to the crankshaft, connecting rod and wristpin bearings under pressure. A splash plate is interposed between the upper and lower sections of the crankcase and the other moving and reciprocating parts of the engine are lubricated by splash and the centrifugal movement of the crankshaft. The filtration screen surrounding the suction chamber can be removed by with drawing it from the lower side of the crank case. There is provision for draining the sump and the suction chamber separately. The oil filler and breather pipes are so constructed that there is no probability of dust or dirt being carried into the crank case. The engine is governed by a governor operated by pressure from the oiling system, which is claimed to be exceedingly efficient and dependable. Being fully lubricated there is little probability of wear.

Fuel Gas Is Preheated.

The exhaust manifold of the engine is large in size and is so constructed that the heat from the exhaust gasses will preheat the incoming mixture in the intake manifold. The intake manifold is a down draft, hot point type. At the point of division between the front and rear cylinder units a deeply corrugated baffle plate is installed, and this plate is heated by radiation from the exhaust manifold. It serves not only to divert the fuel gas, but being hot it more thoroughly vaporizes the gas so that it becomes a much more homogenous mixture, a quality that is especially desirable when low grade fuel is used.

The efficiency of the cooling system is promoted by a large fan that is driven by

a flat belt. The fan is mounted on a cast bracket on the front of the forward cylinder unit and it is driven from a pulley on the extension of the crankshaft. The tension of the belt can be maintained by adjusting the bracket. A high tension magneto is the intended source of ignition current, and all wiring from the magneto to the spark plugs is encased in tubing so that it is thoroughly protected. The location of the spark plugs in the combustion heads is such that the plugs are well cooled.

TRUCKING ON ISLE OF GUAM.

The Isle of Guam, captured by the United States during the Spanish War, and the most distant of Uncle Sam's island possessions, which is a naval station, is probably the last place that one would believe would establish truck efficiency, yet a very interesting story is told by C. E. Stevens, who drove a Garford truck for a construction company engaged in work there, and who is now foreman of the garage maintained by the naval department.

He states that the truck had been driven close to 12,000 miles and is still on its third set of rear tires and the second set of front tires. Aside from tire renewals and a few minor repairs no work has been done on the machine. The engine, transmission gearset and worm axle have required no attention, which was regarded as exceptionally good service, considering the tonnage the truck has hauled up and down Radio Hill, two miles long and having close to an 18 per cent. grade, besides hundreds of trips carrying laborers. There are four trucks on the island of the same capacity and different makes, but the best work was done by the Garford, says Stevens.

With the truck Stevens hauled all the cement, sand, rock and steel for the foundation, and all the steel, paints and other material for building the towers, as well as the tools, rigging and equipment used for construction, including the donkey engine and the derrick poles, one 40 and the other 60 feet long. Some of the steel was 40 feet length and weighed 3000 pounds, and to handle these a special rack was built on the truck body so that the units could be extended beyond either end of the body, clearing the seat and dividing the load so that it was carried with reference to the design.

STANDARD COST ACCOUNT.

The introduction to the "Motor Trucks of America," written by S. V. Norton, manager of truck tire sales of the B. F. Goodrich Rubber Co., 1918 edition, is a very strong argument for a standard system for recording the operating costs of power trucks. Mr. Norton is an authority on truck maintenance and proves without question that with such a system of accounting large economies could be obtained by practically all owners.



A Garford Truck Operated by a Construction Company on the Isle of Guam, the Most Distant United States Possession, Erecting a Wireless Telegraph Tower.

HIGHER MATERIAL MARKETS WILL MAKE ENGINES SCARCE.

Because of the shortage of iron and steel due to the demands for war needs, there is scarcity of materials for oil fuel engine manufacture, which will be realized soon in higher prices, as manufacturers not having long contracts are paying much more for stock and little can be obtained.

Ed. H. Witte, president of the Witte Engine Works, 2280 Oakland avenue, Kansas City, Mo., which is said to be the largest exclusive engine builder in the world selling direct, says: "We are still offering immediate shipments on both kerosene and gasoline engines in all styles and sizes. I don't know how long we can keep up, but those who order now can get an engine at a favorable price as compared with what we may have to ask later. In view of the fact that labor will be high and men hard to get, a reliable engine is most desirable, as it will take the place of two to six men, according to the work to be done and the size of the engine used. I will be glad to mail my new book, "How to Judge Engine," to all who are interested in shop power. This book contains valuable information as to what kind of work an engine should do, and the kind of engine best adapted for general use with all kinds of fuel. The book will be mailed free upon application to the above address.

TRIPP HEADS ORDNANCE PRODUCTION DEPARTMENT.

Guy E. Tripp, chairman of the Westinghouse Electric and Manufacturing Co., Pittsburgh, Pa., has been granted a leave of absence for the duration of the war by the board of directors that he may devote his full time to his new position as chief of the production division of the Ordnance Department of the War Department. His appointment was one of the steps in the reorganization of the Ordnance Bureau recently announced by General Crozier.

WANT WOMEN TRUCK DRIVERS.

The Depot Quartermaster of the War Department will use 100 women motor truck drivers on the streets of Washington. The drivers will receive \$70 a month to start and will not be called upon for service abroad. The department has asked the Civil Service Commission to provide a list of women eligible for the work.

GOODRICH BROS. IN WAR SERVICE.

Charles C. Goodrich, a son of Dr. Benjamin F. Goodrich, founder of the B. F. Goodrich Rubber Co., Akron, O., and a director in the company, has received a commission in the ordnance branch of the War Department and will immediately go to France. His brother, David M. Goodrich, is a major of infantry in the army.

NATIONAL ROAD POLICY URGED.

The members of the American Association of State Highways Officials have sent resolutions to the director general of railroads setting forth their views as to necessary Federal action to be taken on a national policy of road building. The resolutions are as follows:

The proper construction and maintenance of the highways of the country is necessary to the successful conduct of the war, and the plans of all highway authorities in the country, all users of the highways and all citizens interested in any way in highway construction and maintenance, are at the present time upset and tied up. There is need for a definite policy so that plans can be formulated for the coming year and a properly outlined policy directing the construction and maintenance of such roads and streets as are of general economic and military value will conserve the resources of the country and will greatly facilitate the transportation of freight over highways and streets.

BUILD FACTORY IN TWO WEEKS.

What is claimed to be record time for construction of a factory building has been made in the erection of a unit at the plant of the Indiana Truck Corporation, Marion, Ind., when in two weeks a structure covering more than an acre of ground was so far completed that it could be utilized for every purpose intended, although other work was necessary to finish it.

The company has contract to construct a large number of trucks for the United States army service and its production facilities were far from adequate. Only with large increase could the company reach the necessary output. There was no alternative than building a good sized unit. Ordinarily the severe winter would have prevented construction until spring. Contractors were willing to undertake the work and contract was made for a rush job.

As will be noted from the accompanying illustration the building has cement walls that required light foundations



Factory Unit for the Indiana Truck Corporation's Plant at Marion, Ind., Built in Two Weeks After Signing the Contract—A Record Accomplishment.

Therefore, be it resolved, That the American Association of State Highway Officials request the United States government to formulate and promulgate, as soon as possible, a definite policy for road and street construction and maintenance, and that it is requested that said policy contain a statement that freight cars shall be furnished next spring for the transportation of the necessary materials for the construction and maintenance of streets and roads of economic or military value.

TROY WAGON WORKS CONTRACT.

The Troy Wagon Works Co., Troy, O., is completing production on an order for 1250 five-ton trailers for the French government. Each trailer is equipped with separate braking mechanism, which acts on each wheel.

STEWART ECONOMY DIRECTOR.

Y. F. Stewart of Cleveland, O., well known to trade interests of the motor vehicle industry, has been appointed director of sales of the Economy Motor Truck Co. of Tiffin, O.

and a wooden monitor roof and a considerable part of the walls are windows. Before work could be done on the roof the walls had to be practically completed. The site was cleared of snow to place the foundation and in two weeks to a day from making contract the photo from which the illustration was made was taken. Then the building was entirely closed in.

The installation of machinery and tools was made quite as rapidly as the work. The company started on its contract before the carpenters were out of the building. The structure is simple enough, being practically a shell covering nearly 50,000 square feet, but considering the conditions with reference to scarcity of labor and materials and the exceedingly low temperature while the work was in progress, the claim for speed is exceedingly well founded. In any event it is a splendid example of the high efficiency of the power vehicle industry.

Special bodies will be designed by C. E. Ploch, who has been engaged as chief engineer for the Fruehauf Trailer Co., Detroit, going to it from the Packard company.

CONSERVING TIRES A PATRIOTIC DUTY

UTILIZATION of trucks for freightage or general haulage depends in no small measure on the production by tire manufacturers. At the beginning of 1917 about 300,000 trucks were in use in the United States, exclusive of converted car chassis. During the year about 100,000 vehicles were built exclusive of those sold abroad. A considerable part of these were taken by the United States for army purpose. At the beginning of the present year upwards of 400,000 trucks and probably 100,000 converted chassis were in service. These are being added to as rapidly as the industry can build them. While there will be lessened production by some of the manufacturers, increased output by others will probably offset this so that during the present year not less than 125,000 vehicles will be built. Of this number not far from 25 per cent. will be taken by the government.

The demand for solid tires has not only increased with the production of trucks, but there has been a corresponding increase in need of equipment for converted chassis. Besides equipping all the trucks turned out during the year, will be whatever number of shoes may be required for all army trucks. The government must have a large reserve at all times, because lack of tires would absolutely cripple army operations. After this need has been met the industry can be supplied and then the truck owners can be provided for.

Enormous Demand for Trucks.

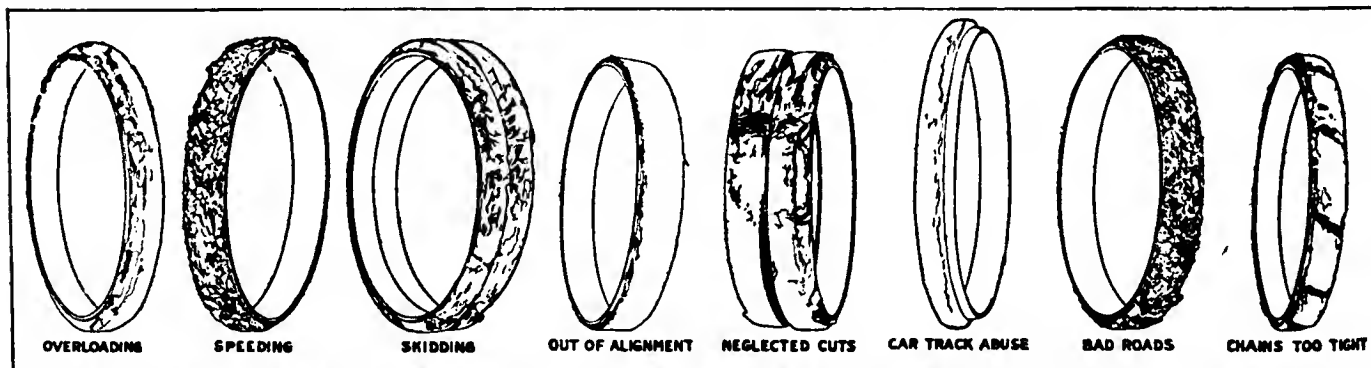
Allowing eight tires for each government truck, which is not an excessive reserve, and estimating the requirements with reserve at 16 tires a year, 50,000 trucks would need

save tires by the exercise of such care as will insure the longest practical service life.

This statement is not meant to alarm truck owners nor to make prediction of a condition that may not be keenly realized. The main object is to emphasize that every care that will conserve tires should be taken. Those who will benefit will be the owners of trucks, and they will profit in exact ratio to their own endeavors. They will make no sacrifice, but will have better service, will insure against increase of prices and will reduce their operating expense in the exact measure that they save their tires. From patriotic motives alone there ought to be a very willing response to the suggestion, which has originated with tire manufacturers, for it is a contribution that all truck owners and drivers can make, and in helping their country they are helping themselves materially.

How Tires Can Be Conserved.

Some of the tire manufacturers have taken upon themselves the duty of advising truck owners wherein savings can be made, and have undertaken this systematically with the purpose of disseminating information generally. The B. F. Goodrich Rubber Co. has had prepared a series of illustrations of the results of anticipated conditions of solid tire wear resultant from carelessness, neglect or ignorance, pointing out with reference to each what means of conservation are practical. Nothing that is suggested is in any way prejudicial to the interests of any owner, and the results obtain-



Sketches Prepared by the B. F. Goodrich Rubber Co. to Impress Upon Readers Who Use Solid Tires the Destruction That May Be Avoided by Careful Driving.

800,000 tires alone. Adding to this six tires each for 500,000 machines would increase the total close to 4,000,000 solid tires. This is a greater production than the industry can turn out with present facilities and resources unless less attention is given to pneumatic tires and every endeavor concentrated on the solid shoes.

Statement is made by those who have given the subject careful study that in any event the government will require 500,000 truck tires. This is a considerable shrinkage from the statement above, but evidently based on a smaller number of trucks and perhaps not as great an allowance for a truck. Besides the factory facilities there are two other factors of importance, the one being the supply of rubber and the other the supply of steel for the rims, for all solid tires must be built on rims, and materials are difficult to obtain. Of course the government needs will be met first of all and attention will be given to others in logical order.

There is probability of much greater use of trucks the present year in freight haulage, in addition to the usual demands for general transportation. This means even greater consumption of tires. As the production will be limited there is every reason why the owners of trucks should, aside from the usual desire to economize operating cost, endeavor to

able are so practical that there appears to be no reason why all owners and drivers should not follow them all willingly.

Emphasis is made that practically every truck owner in his desire to get the most out of his machine will overload it, which is more disastrous on the tires than any other element of the vehicle. Sketch No. 1 in the accompanying illustration will evidence the damage resulting from this very general fault, for which there is but one prevention, keeping the load within the rating of the machine. The following table will indicate the loads that single and dual tires are designed to carry:

SINGLES							DUALS						
Width of Tire	Height of Tire	Width of Wheel	Diam. of Wheel	Carrying Capacity	Nominal Size of Tire		Width of Tire	Height of Tire	Width of Wheel	Diam. of Wheel	Carrying Capacity		
5	13/16	3 1/4	4 1/4	28	2500	34x5	11 1/2	3 1/4	10	28	7000		
				30		36x5							
				34		40x5							
				36		42x5							
6	13/16	3 3/4	5 1/4	28	4000	34x6	13 1/2	3 3/4	12	28	10,000		
				30		36x6							
				32		38x6							
				34		40x6							
				36		42x6							
7	13/16	3 3/4	6 1/4	30	6000	36x7	15 1/2	3 3/4	14	20	12,000		
				34		40x7							

Overloading Invites Destruction.

A tire broken down from overloading cannot be restored because the rubber has been compressed beyond the safe

limit of elasticity. The rubber will crack and deterioration follows. Once overloading is sufficient to begin the destruction of a tire.

There are those who believe that a solid tire is not subject to heating, which is one of the causes of pneumatic tire failure, but it is a fact that heat is just as destructive to the one form of tire as the other. When vehicles are driven fast heat is generated by the internal movement of the rubber compound, due to rapid displacement and friction with the road, which often causes damage and then disintegration. The effect of this abuse is shown in sketch No. 2.

The results of skidding are evidenced in sketch No. 3. Could drivers realize that trucks will be stopped quicker when brakes are applied gradually than when engaged suddenly they would undoubtedly use them more judiciously. There is equal danger from skidding when turning corners fast. Repeated skidding has worn the tire sketched in the illustration so that it is being torn apart. If one brake shoe clamps and the other does not the machine must skid, causing a flat place on the tire tread, and in the event of again skidding the wheel will turn until the flat place contacts with the ground, doubly wearing the worn spot. Continued skidding must be destructive.

Misaligned Wheels Causes Damage.

An observer might believe that the tire shown in sketch No. 4 had given satisfactory haulage, but the subject of the illustration was taken from the front wheel of a truck that was not in alignment and the effect was continuous friction upon the tire. A wheel not revolving in truth partly rolls and partly slides and the tread is quickly worn. Should the driver note that the tread of a tire appears to be scaly he should have the wheels aligned. Misalignment is usually resultant from a hard jolt that distorts the wheel or bends the wheel spindle.

Surface cuts are a very common cause of tire damage. An instance of this is shown in sketch No. 5. The cuts may have been caused by driving over glass, pieces of metal, stones or objects having sharp edges, and as these were not given attention they were increased in size by the stresses upon the tire. Were the cuts sealed with cement or the edges trimmed to lessen resistance, much longer service life could have been obtained.

Circumferential cuts on the tread of the tire are commonly noted in cities where the trucks are driven in car tracks. The load is carried by half the tire and the other half is cut by the edges of the tracks or the switches and frog. The only way the tire can be protected is to drive on the road surface, where the entire surface will carry the load and there are fewer obstructions. What happens when tires are driven on tracks is shown in sketch No. 6.

Where the road way is rough or of broken material, crushed stone or the like, the driver, if he cannot avoid it, should move slowly and with extreme care, for tires will become scarred very quickly from contact with sharp edges of obstacles, and when once cut can be easily torn and shed. Repairs cannot be made to tires damaged in this manner, the effect being shown in sketch No. 7.

The equipment used to prevent skidding will be more or less damaging, but the minimum wear from this cause is when loose chains are used. There is danger in skidding, to be sure, but a great deal of the danger is caused by careless driving. Sketch No. 8 shows a tire where the wheel has been equipped with a grip that was practically firm and wore quickly into the surface. Only when absolutely necessary should tires be driven with chains or other similar device.

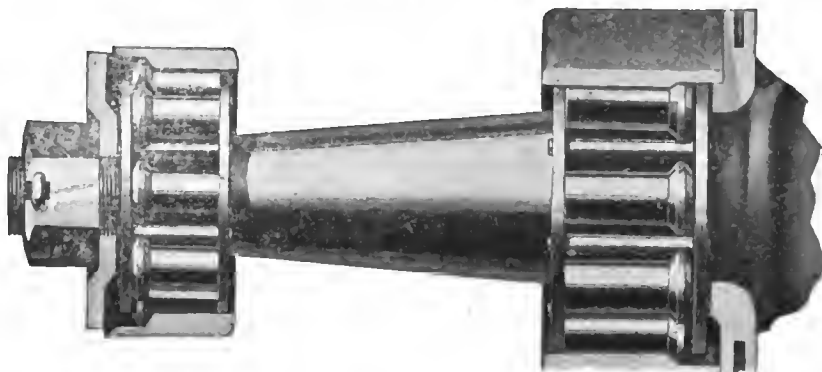
The Bourne Magnetic Truck Co. is removing its plant from Philadelphia to New York City, where it will have a factory with 50,000 square feet of floor area at 142nd street and Fifth avenue. The company will build the present series of trucks and will also produce a vehicle having 30-passenger capacity and equipped with flanged wheels for use on railroad tracks. These are intended for use on electric street and highway lines where the runs are considerable length.

BOWER ROLLER BEARINGS.

Designed to Have Different Surfaces Take Varying Thrusts. They Are Extremely Enduring In Any Service.

One of the main objects of engineers designing or constructing power vehicles is to minimize friction of moving parts, so that the importance of bearings is very great. In fact, a great deal of the efficiency of the automobile depends upon the degree of frictional reduction. According to bearing engineers there are 17 main points or places where power may be lost from friction, and four others in which the strength of the drive may be unnecessarily exerted. Taking these in order and not considering the power plant these points of power loss are four in the front wheels, four in the steering gear, five in the transmission gearset, two in the driving shaft, two in the differential gearset and four in the rear wheels. In all of these the power usefully applied and the consumption of fuel and lubricant, as well as the life and utility of the machine, will depend largely on the character of the bearings.

Statement is made that engineering has proven that exceptionally heavy stresses are endured by the front wheel bearings of an automobile vehicle, because they are subjected to the side thrust from turning and steering, as well as the shocks from contact with road obstructions of all kinds. Claim is that because of unusual stability and load carrying capacity Bower roller bearings are used on the front wheel spindles of a large percentage of American cars and a still greater percentage of trucks; that after being proven for this work they are usually selected for other parts of the ma-



Front Wheel Hub with Section Cut Away, Showing Bower Roller Bearings Installed.

chines where absolute dependability and economy are essentials.

Bower roller bearings are scientifically designed, so that there is a separate surface for every stress, vertical load or end thrust. The division of stress minimizes any possible wear, and as the rollers are self-aligning there is never need of adjustment. Another claim for these bearings is that they have greater load carrying capacity than any other in equal space. The raceways of Bower bearings are at all times parallel, so that the load is borne evenly along their entire surfaces, and the load upon the bearings cause no end thrust. The only end thrust comes through horizontal stresses. Because the raceways are parallel and the rollers self-aligning, no adjustment can be made. A statement always emphasized is that a machine equipped with Bower bearings and carrying a load will start easier and coast further than if fitted with other types of bearings.

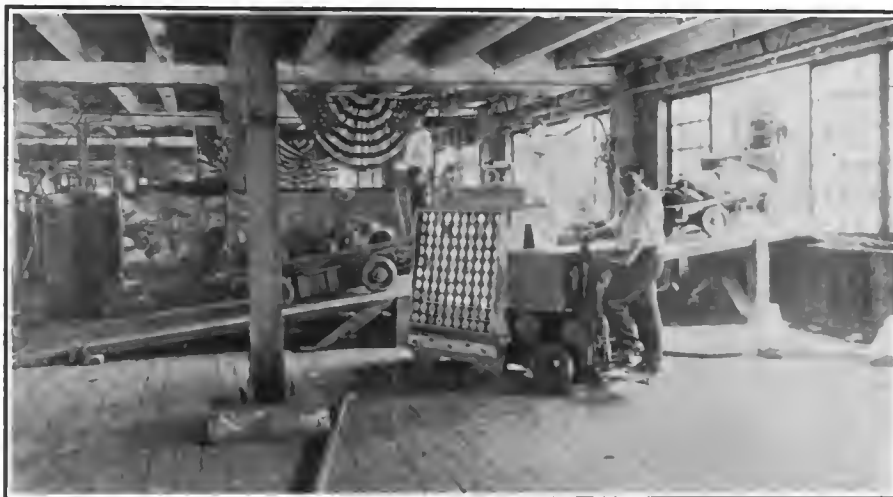
The Nelson Motor Truck Co. has been formed to manufacture Jumho trucks, which were developed by Nelson Bros. Co. of Saginaw, Mich. The first machines produced will be 2½-ton capacity and these will be driven by internal gears. The company intends to increase the number of sizes until a complete series is built.

One of the features of the 10th annual automobile show at Newark, N. J., was a department in which was exhibited 23 different makes of trucks and chassis. There was decided interest in all types of power trucks and tractors.

ELECTRIC TRUCK ECONOMIES

Industrial Types Utilized to Save Handling in Munition Plants.

The cost of handling material in process of manufacture is a much larger part of the expense of production than is



Carrying Cases of Three-Inch Shells and Loads of 4000 Pounds of Shrapnel Bullets Up Inclines, with Electric Industrial Trucks in Munition Plants.

generally believed, and because of the shortage of labor and the high wages paid in industrial plants many concerns, especially those engaged in producing munitions or supplies used in prosecuting the war, have sought to minimize manual labor by installing electric industrial trucks. These are usually types having from 3000 to 4000 pounds normal load capacity, that are fitted with platform bodies and with crates and racks can be driven from one department to another, quickly loaded or unloaded, and worked almost constantly by exchanging batteries or by boosting charges given at such intervals as may be practical in the routine of work.

Industrial trucks of this type have been used for some years in small numbers in large industrial plants and at some of the freight terminals of railroad and steamship lines and have been found extremely serviceable. No figures that will apply generally can be given because of the very wide diversity of conditions of use, but broadly these machines will replace from three to five men, one operator doing work for which from four to six were necessary, with greater speed.

A few years the United States government used a number of electric highway trucks in several arsenals, which were found to be serviceable. Later on when plants in this country began making war munitions industrial trucks were utilized for inter-department transfer, and now in a very large number of works these machines are used. Production of munitions has been under such pressure that most concerns having contracts have operated day and night, and handling has of necessity been hastened. Conveyors have been tried without the same measure of success as with trucks because these are stationary equipment, while trucks can be worked wherever a floor is clear. Conveyors do not require more labor, but changes cannot be made without material expense. There is, as well, a danger from friction that must be avoided where explosives are handled.

Electric industrial trucks have been found to meet practically all requirements. In England most of these are

driven in factories by women, and fitted with special bodies they can be loaded and unloaded very rapidly. The types of trucks vary with the design of builder, some being made small to be used in the aisles of factories and storage warehouses, or to be handled in elevators and freight cars, and while the standard capacity is 4000 pounds, loads up to 20,000 pounds have been carried. With average loads inclines too steep for hand trucks to be worked on are ascended and descended readily. Some trucks have elevating platforms that will lift and carry and lower freights that have been stacked for transfer, so that time of moving is much reduced.

A fleet of 49 trucks of the standard type is used by a company manufacturing gasoline automobile vehicles in a plant that has 110 acres of floor space. The average haul is 150 feet and there are grades as high as 12 per cent. on which the machines are used. The trucks are all kept in a garage 80 feet square and charged and maintained there. With an operating record covering a month the average cost a truck a ton mile was shown to be as follows:

Labor.....	\$2.040
Power.....	.066
Maintenance.....	.010
Investment and depreciation.....	.017
Total.....	\$2.133

The average loaded mileage was 3.7 miles a day and unloaded mileage was approximately the same, and the total daily tonnage was 14.1. In one department of this plant 18 men were worked daily unloading electric batteries from freight cars with hand trucks. With one industrial truck eight men now do the work considerably faster, and while the saving in this particular instance is the labor of 10 men specifically, it is in reality greater when the more rapid work is considered.

The Grant Motor Car Corporation, Cleveland, O., is perfecting the design of a 7000-pound truck which will be built commercially as soon as the design has been determined. The machine will have an internal gear axle of Torbensen make and there is expectation it will follow the general design of the smaller trucks now built by this concern.

Statement is made that a worm driven truck of 4000 pounds load capacity will be produced within the next few months by the Reo Motor Car Co., which now produces a chain driven truck of the same capacity.



Electric Industrial Truck Carrying Rough Turned Shells for 220 Millimeter Guns to Another Department for Further Machine Work.

TRUCKS IN TEXTILE MILL SERVICE

Economies Realized in Ratio to System of Operation and Records of Work and Cost—Equipment of Pacific Mills Splendidly Productive

TEXTILE manufacturers are as a class closely studying the economies that may be realized from the use of power trucks for highway haulage. The possibilities depend largely upon the locations of the plants. A large part of the industry of New England and the Atlantic coast states is cotton and wool manufacturing. In a number of cities the textile mills are the principal industries, as in Fall River, New Bedford, Providence, Lowell, Lawrence, Nashua, Manchester, Pawtucket, Woonsocket, Newburyport and others of smaller populations. Some of these are at tidewater, but others are on streams that afford more or less water power. The tidewater cities have the advantage of water lines of transportation, as well as railroads, but those inland have only the railroads.

In hundreds of smaller communities are plants that have water privileges that afford more or less power. These towns and villages are more or less dependent upon these mills. Because of the high cost of fuel, and there is no reason to believe that the pre-war prices for coal will be realized for a long period of time, these privileges are extremely valuable. As the water rights are continuous they have increased very largely in value. Owners of water power manufacturing, who may be located more or less remote from railroads and shipping terminals and ports, who require coal practically for heating only, must pay freightage for whatever fuel is used, for raw materials and finished products.

The railroads will undoubtedly increase freight rates. The increase, however, will affect all practically the same. Water freights will probably not be increased in the same ratio. Wherever highways exist a considerable economy can be obtained by the use of power trucks, especially if tonnage can be hauled so that all mileage is productive. Highway haulage can be made economical in the ratio that a service is equipped, organized and directed, and while there are those who will apply this to considerable distances, as a matter of fact the statement is true of practically any distance, even in yard or inter-factory transportation.

Machine Production Possibilities.

Textile manufacturers understand the possibilities of machinery production. They know that productiveness depends upon continuity of use and insuring so far as possible against loss of time. What is true of factory equipment is also true of transportation equipment. Lost time is waste. Considerable investment may be necessary to obtain economies. Possibly the largest saving may be afforded by changing facilities. But unless this is done the fullest economy may not be practical.

Emphasis may be made that the average business man considering buying power trucks is not as a rule convinced that there is a definite service life to machinery. The manufacturer may know definitely what he can expect from machine equipment in a mill, but he is uncertain of trucks. But

from any viewpoint there is more certainty of truck life than of animal life. Both depend largely upon care and judgment, but animals are not immune from a long list of diseases, from accident, and they must be given more attention daily to keep them in ordinary working condition than a machine.

The dependability of both electric and gasoline trucks is well enough established. Electric trucks have been used for nearly 20 years, and gasoline trucks for more than 15. The power vehicles of today have been vastly improved as compared with those first produced, and there is the best of reason to believe that the life of the machines built by standard manufacturers will be 10 years, instead of the commonly accepted maximum of five years, provided they are consistently adjusted and repaired.

Requirements for Haulage.

Classification of plants with reference to character of haulage is hardly practical because conditions differ very largely and groups would not adequately describe requirements. Roughly, however, these may be stated:

Water power mills, not reached by railroads or vessels, where materials and supplies and products must be hauled between them and the shipping and receiving terminals, the distances being considerable.

Steam plants where haulage is between them and wharves and railroad freight stations, the distances being shorter.

Plants where shipping is direct by spur tracks or sidings or from wharves, and haulage, if any, is for very short distances.

At all of these, however, if the mills are of considerable size, there will be inter-yard or inter-factory haulage. Obviously the equip-

ment that can best be utilized will depend largely upon the distance for haulage and the volume of freight to be carried. There is no other basis for determination than economy—the service that will be adequate and will cost the least.

Knowledge of Operating Cost.

An advice to those who are considering the use of trucks is first of all to determine the cost of operating the equipment in use. This does not mean some of the expense, but every item, and the tabulation should include administration, supervision, clerical service, rent, heat, light, supplies, insurance, taxes, water and other details. These data are necessary to establish cost.

If many who now use horse vehicles were to know the actual expense of operating them there is no question that a change to power trucks could not be too quickly made. The purpose of using trucks is plainly to economize, to obtain better service for the same cost, or the same service for less cost. When the operation of power trucks is begun a record should be inaugurated. Accepting this as a standard, or level, endeavor should be made to lessen expense or to do more work; the figures ought to show where possibilities obtain, and they will also indicate, by comparison, gains or



Front of the Model Garage of the Pacific Mills, Lawrence, Mass., Designed to Obviate Accident and Labor and Afford Ideal Storage Facilities.

losses from the standard, or any standard that may be later on determined.

But the record ought to show all work done and the daily, monthly and annual expense for every material item or group of items, and assuming that the machines are not driven unnecessarily the cost a mile will be a very safe indication. It is the closest unit for computing cost that has been determined by practise.

An Ideal Textile Mill Service.

With reference to actual use of motor vehicle equipment by textile mills, what is probably the largest and the best systematized and operated service is that of the Pacific Mills at Lawrence, Mass., which operates mills and print works, there being several plants in different sections of the city. The mills have steam and water power and spur tracks from the Boston & Maine railroad into the different mill yards insure very material economy in receiving raw materials and supplies and shipping finished goods. In common with manufacturing practise, materials and supplies of all kinds are kept in store houses and distributed from these to the different departments of the plants. For obvious reasons this distribution must be systematic and for the purpose of insuring against waste the stores are drawn against by requisition and sent to the divisions either regularly or intermittently.

In the winter of 1909 the company was operating 15 horses

The company decided to convert its horse equipment to power vehicles, and plans were made that included the erection of a fireproof garage to store 20 trucks and the purchase of both electric and gasoline machines. At the time the two trucks were worked with horses the average haul in the yard was 2000 feet—work in which animals are expected to show the greatest economies as compared with power trucks, but as the company was then extending its plant to other parts of the city and the hauls would be considerably increased, both electric and gasoline machines were decided on. The reason for the electric trucks was that these were believed to be the most economical for the service required of them, and gasoline trucks were for such work as necessitated fast or long hauls.

Service Very Rapidly Increased.

In making the change the purpose was to abandon horses and stables and incidental equipment as quickly as was consistent, but the last horse was not disposed of until two years later, although at that time the power vehicles were approximately the same in number as the animals. This was due to the expansion of the plant by the erection of three large mills and the very large increase in transportation.

Before the reduction of horses was ordered the garage was built and an operating plan determined. The garage is long, narrow and a single story, of brick and concrete, along one side of a yard. The one end of the building contains a



Part of the Fleet of Gasoline and Electric Trucks Operated by the Pacific Mills, the Economy Over Animal Haulage Being More Than 20 Per Cent. with the Same Record and System of Accounting.

In practically inter-yard haulage, there being but little use for them outside of this work. Decision to experiment with power truck haulage was reached and a used machine purchased and operated in the same work as the animals. The company had accounted the cost of its horse vehicles very closely—in fact as closely as its production cost—and for that reason was without preparation of any kind able to determine, with a careful record of power vehicle expense, what economy was possible. There was realization that results with a used truck, with relatively higher upkeep, and operated without a systematized organization, would not be equal to what might be obtained with new and better trucks and a well developed system. The economies were sufficient, however, to justify after the experience through one winter the purchase of another used truck.

Truck Qualities Fully Demonstrated.

The method of operating the animals was such that practically all that could be realized from trucks was greater load capacity and speed, with the reserve to work continuously whenever necessary. From this statement one understands that this period of experiment, covering a year, was of animals against trucks, the former type of equipment being better understood and worked with every care to obtain the most efficient and economical service. Had the trucks been new and worked as they were later on the economies might have been even more pronounced.

garage office. At the other end is a repair shop, equipped with machine and hand tools, in which is located a large charging board, reached from a balcony, so there is no possibility of accident from contact with the charging system. The rear wall is constructed with a series of windows well above the tops of the truck bodies. The front is practically a series of eight wide doors, separated by posts supporting a wall pierced for windows similar to those at the rear. The doors are a steel curtain type, balanced so that they can be handled easily and quickly.

Garage Planned to Save Labor.

The building is considerably deeper than truck length, and the floor space is such that 21 trucks can be stored side by side, with narrow aisles between them and sufficient area ahead and behind them for any work. The building is so designed that the trucks can be backed in or driven out without turning, and there is very little if any need for moving them, so that danger from movement on the floor is obviated. The garage is wired so that the electric trucks can be charged at any time and at any part of the floor, 12 charging plugs being available, and this means saving the time of the drivers.

No necessary facility has been omitted and no non-essential has been included. The purpose has been to have the garage completely equipped, that whatever might be required for attention, upkeep or maintenance could be done thorough-



Two Pierce-Arrow Five-Ton Trucks Operated by the Ipswich Mills, Ipswich, Mass., Manufacturer of Hosiery for General Service.

ly and quickly. The garage was designed that it could be added to without interruption of its use or causing retardation of the service.

System of Operating the Trucks.

The manner of operating the trucks may be likened to a railroad system. All the machines are operated under the direction of a superintendent of haulage known as the dispatcher. He has an office in the yard of the main plant, which can be reached by telephone by every mill department. The drivers of the trucks report to the garage, where the machines are ready for them, each morning. Report is next made to the dispatcher's office by each driver, and upon reporting assignment for route or special work is given.

In the dispatcher's office is a sheet on which is printed the name of each of the places of regular delivery from the store houses in the order of outward and inward trips, with ruled columns for each vehicle doing distribution work, which are designated by number. One column covers each trip. The number of stops will approximate 40. This same sheet covers the work that may be done by practically all of the machines in regular assignments, and to this is added any record that may be necessary to account for special work.

An Example of Truck Work.

Taking a truck as an example: The driver leaves the garage when instructed to do so by the dispatcher and begins the work assigned to him. The time of reporting is noted by the dispatcher. From the time of leaving the garage the man is absolutely under his direction. No work can be done save by his instruction and each man has a schedule to work to. If the truck should be distributing, the time when it should be at each station on the outward and inward trip is noted. From all mill departments orders for haulage are telephoned to the dispatcher, who can state when a vehicle will arrive and will know whether or not the order can be filled by regular work. If necessary he assigns a special truck for a work. While a truck may stop at all of the stations, it may not be necessary for it to stop to load or unload freight at more than two or three during a trip, but each driver telephones the dispatcher from specified stations and receives whatever orders may have accumulated after starting. So one understands that the service is scheduled as is the operation of railroad trains.

If the driver does not reach the station on time, or he is delayed, he must explain the cause and immediately responsibility for the retardation of the service is sought. No matter what the cause, emphasis is made that repetition cannot be tolerated and that receipt from and delivery to the trucks must be expedited. Each order is recorded by the dispatcher and when an order is given a driver by telephone it is written on a form, and after the work has been completed the order is

left at the "store office." The trucks and wagons all report to the dispatcher whenever a trip or a work is completed and the next assignment is given and begun without delay.

The system is planned so that there are no opportunities for drivers to lose time. They are required to live up to the schedules of the routes and to complete all work as early as they can. In the event of accident notification of the dispatcher provides a relief vehicle. The machines engaged in irregular or special work are worked with equal care. They are allowed time for loading, distance traveled and unloading, and the drivers are required to do the work in the time allowed. One work is the distribution of ashes from the power plants, these being delivered

about the city and a specific charge being made for this service.

At the end of each day the dispatcher's records are sent to the "store office," where all of the service records are kept, and from these the work of each machine can be ascertained. Each driver, at the time the machine is garaged, makes report that includes note of the odometer reading at 6 o'clock, the quantity of gasoline, oil and grease used and the work of the day. In addition he may specify an accident, the cause, the time stopped by accident, time stopped by any other cause, the supplies bought and repairs made during the day.

Maintenance Is Systematically Done.

The machines are delivered to the garage at night, and there they are given whatever attention may be necessary by the mechanics, the electric machines are charged and fuel, water and lubricant replenishments are made. The adjusting, oiling, greasing and other work is done at night, and the batteries of the electric trucks are examined, tested, equalized and charged after the day's work. While the hauls are extremely short as an average, the manner of operating the trucks results in surprising mileages, that will frequently exceed what would be made by machines engaged in what is regarded as long haulage. This indicates that the trucks are kept moving and are not idle.

The company operated animals extremely economically because it knew the actual cost of its service. It could determine inefficiency, lost time and waste of any kind. It could economize wherever economies were possible. A fair assumption is that the company operated for not more than 90 per cent. of the cost of other animal services. Yet with truck equipment it saved approximately 20 per cent. of the expense of the same work with horses. An equally reasonable assumption is that it operated with trucks for not more than 70 per cent. of the cost of other concerns doing similar work in Lawrence.

The result so far as the Pacific Mills are concerned are



A Pierce-Arrow Five-Ton Truck, Owned by the Rhode Island Processing Co., Coventry, R. I., Driven an Average of 60 Miles Daily Since August, 1912.



A Mack 3000-Pound Truck, Operated by the Botany Worsted Mills, Passaic, N. J., for General Purposes for the Plant.

not in the least due to favorable conditions. The same plan and the same system would be extremely economical elsewhere. Instead of assumption the company possessed facts absolutely established, and with these and the application of common sense business principles it developed an operating plan that has been productive of real results.

What Is Practical With One Truck.

There are those who may believe that substantial economies are not practically possible with small freightage. An example that is illuminating is that of the Rhode Island Processing Co., at Coventry, 22 miles from Providence. Until August, 1912, this company shipped freight to different parts of the country, but largely to New York City, by railroad. From 10 days to two weeks was a fair average of the time elapsed before receipt. Then it bought a five-ton Pierce-Arrow truck and since that time, save two intervals of a week each, when the truck was overhauled, not less than capacity loads have been hauled to the piers at Providence, shipments reaching New York City the following day, and similar loads have been hauled back to the plant.

The truck is driven an average of 60 miles a day six days a week, and the mileage of the machine is now in excess of 100,000. The truck must break four miles of road from the mill to Washington, R. I., after every snow storm, and the driver has not missed a trip because of road conditions. While the truck saves money for the company because of its certain service, quick shipments are worth a great deal more in a business way, and the machine has become as essential as the mill machinery to carry on the plant operations. Because this machine cannot be operated to a system like that of the Pacific Mills there is no reason to doubt its economic value. It has very greatly simplified transportation of the concern's materials and products, and is the connecting link with a steamer line (work that could not be done with animals or other type of truck) through which marked marketing advantage is maintained.

Description of the service of any number of textile plants, even briefly, would require space that cannot be devoted to even this intensely interesting subject. The Sayles Bleacheries, Saylesville, R. I., which is the largest establishment of the kind in the world, ships and receives by railroad, a branch operated by the company connecting with the main line of the New Haven railroad, but two $3\frac{1}{2}$ -ton Mack trucks are used regularly between the plant and New Bedford, loads being carried in either direction, a distance of 35 miles. In the yard and between the bleachery at Saylesville and the Phillipsdale, R. I., plant, two Walker three-ton trucks are used for general haulage, and two light gasoline wagons are

utilized for small loads and errands. In the Saylesville works four electric industrial trucks of two-ton capacity are in service.

Statement is made that the trucks are regarded as any other plant equipment and are maintained and operated under the same supervision. The maintenance and repair work is done by the machine maintenance division and the electric trucks are charged with power generated for lighting and other general purposes.

J. & P. Coats Thread Co., Central Falls, R. I., has no horses in its haulage service. The coal for the plant is hauled from the yard of Olney & Payne Bros., at tidewater, in Pawtucket, R. I., by seven Pierce-Arrow trucks owned by the coal dealer. The shipments from the railroad terminals at Pawtucket and the steamer piers at Providence

are transported by three Pierce-Arrow trucks, which carry return freights to the works. The company operates an American & British gasoline-electric tractor and a long semi-trailer, the deck of which is very low, for inter-factory haulage.

The type is given the name of "low gear," which is also applied to a similar vehicle drawn by animals. The platform is covered with a top with enameled fabric sides. This is used for carrying loaded factory hand trucks from one building to another, covering a route about a mile long, this obviating the handling necessary when horse teams were used. The trucks are run from the platforms into the body and from the body on to the platforms. The tractor and unit are rated at three tons, but a much heavier load can be hauled. The machine replaced two two-horse teams and the labor of six men is regularly saved. This company maintains its own trucks so far as repairs and adjustments are concerned. Its first truck was bought in 1912, and eventually all animals were disposed of, the last in 1916.

Goff Operates Combination Equipment.

D. Goff & Sons, braid and fabric manufacturer at Pawtucket, operates a combination service of one Pierce-Arrow five-ton truck and three General Vehicle electric trucks, the Pierce-Arrow truck being used for long hauls, and the others for work within the city and suburbs. The plant is operated with water and steam power and the electric energy for lighting and other purposes is generated by water power. The trucks are maintained under the direction of the chief electrician and have been found to be very economical.

The Arlington Mills at Lawrence, Mass., and the Amoskeag company at Manchester, N. H., operate combination equipment, both gasoline and electric. The Arlington Mills first purchased electric machines, using them largely for



Loading a White Truck with Wheeled Trucks to Be Delivered from One Department of the Arlington Mills, Lawrence, Mass., to Another.

inter-factory haulage, and later on acquired gasoline trucks, which could be utilized for longer hauls and make faster time.

The electric trucks of the Amoskeag company are primarily used for inter-yard haulage. This company was one of the first textile operators of the country to purchase electric trucks, and after a period of experimentation that thoroughly demonstrated the economy of these machines as compared with animal equipment, the horses were gradually disposed of. Like the Pacific Mills this company very carefully maintains its trucks and for that reason realizes large economies and long service.

Generally speaking, where the haulage is short and long, the combination of electric and gasoline trucks is the most economical and satisfactory, although the electric machines could be worked with exchange of batteries to obtain long

Mass.; the Windsor Print Works, North Adams, Mass.; the Sugden Press and Bagging Co., West Chelmsford, Mass.; the Merrimac Mills, Lawrence, Mass.; the Pepperell Manufacturing Co., Biddeford, Me.; the Fairpoint Corporation, New Bedford, Mass.; Nashua Manufacturing Co., Nashua, N. H.; S. Slater & Sons, Webster, Mass.; Cocheco Mills, Dover, N. H. (affiliated with the Pacific Mills of Lawrence), and outside of these the Oneida Knitting Mills, Phoenix Underwear Co. and the Utica Steam and Mohawk Valley Cotton Mills of Utica, N. Y., and the Wayne Knitting Mills, Fort Wayne, Ind. Of these the Pacific Mills, with four two-ton and two 3½-ton trucks has the largest number of machines in use. The Pacific Mills operates 16 one-ton electric freight trucks in its mills, and a number of the other concerns use one or more of these machines to expedite handling freight.

The number of trucks operated by any one mill does not always indicate the volume of freightage handled, because when spur tracks and sidings enter the yards the freight handling is very largely manual labor. For instance, most of the southern yarn mills use one or two teams of mules and one or two trucks or carts, these being worked in miscellaneous haulage. Many northern mills make haulage contracts and some contractors operate several machines. An example of this service is that of Sullivan's Motor Express, which is operated between Providence and Woonsocket, R. I., and the greater part of the work is hauling materials from the railroad and shipping terminals in Providence to mills in Providence and Woonsocket, and from these mills to the terminals, three trucks being operated all of the time. Another



Two Two-Ton General Vehicle Electric Trucks in the Service of the Merrimac Manufacturing Co., Lowell, Mass., for Yard and Local Haulage.

mileage. This would necessitate extra batteries and charging a considerable part of the time, from 12 to 16 hours daily, according to the work done, but changing can be simplified so that this can be done in five minutes or less, and even with noon "boosting" the mileage of electric trucks can be considerably increased.

Some of the textile plants that utilize gasoline trucks, besides those mentioned, and generally have abandoned animal haulage, include the River Spinning Co., Woonsocket, R. I.; the Centerdale Worsted Co., Centerdale, R. I.; the Wanskuck Mills, Providence, R. I.; the Stillwater Worsted Mills, Harrisville, R. I.; the Mount Hope Finishing Co., North Dighton, Mass.; Fall River Iron Works, Fall River, Mass.; the American Printing Co., Fall River, Mass.; the Border City Mills, Fall River, Mass.; the American Thread Co., Westerly, R. I.; the Victoria Mills, Thornton, R. I.; the Home Bleach and Dye Works, Pawtucket, R. I.; the Hansahoe Manufacturing Co., Valley Falls, R. I.; B. B. & R. Knight, Providence, R. I. (with mills in Rhode Island, Massachusetts and Connecticut); the Crompton Co., Crompton, R. I.; the Apponaug Co., Apponaug, R. I.; S. H. Greene & Son, River Point, R. I.; the United States Finishing Co. (with several plants in Rhode Island); the Livingston Worsted Mills, Washington, R. I. This list is, of course, but a very small part of the textile plants in southeastern New England, but it is sufficient to demonstrate to what extent textile manufacturers have utilized trucks.

Plants That Have Electric Trucks.

The New England mills that have electric trucks, either exclusively or in combination with gasoline machines, in addition to those stated, include the Parkhill Co., Fitchburg,



The Pepperell Manufacturing Co., Biddeford, Me., Operates Two General Vehicle Electric Trucks, Which Do Quite as Good Work in Winter as in Warmer Months.

contract service is that of the Pierce-Arrow Trucking Co., Fall River, which hauls coal from the piers to mills, and incidentally does other general mill work, using four trucks all of the time and occasionally hiring machines when pressure is heavy.

Long Distance Haulage for Mills.

What is probably the most interesting development in textile mill service is the work done by the Hamlet Avenue Garage Co., Woonsocket, R. I., which hauls wool from dyeing plants in that city to Boston, Lawrence, Lowell and South Barre, Mass., and returns with wool to be dyed at Woonsocket. This service is contract work and the trucks are operated daily, although the South Barre trips have been given over since the middle of December because of the snow obstructed roads north of Worcester. This company

has two five-ton trucks and one 3½-ton machine, but augments the equipment when necessary by hiring other vehicles. The company has made three trips from Woonsocket to Philadelphia, carrying machinery and returning with wool. The total mileage is approximately 630 miles, and this has been driven in 92 hours, a crew of two men alternately driving and sleeping, so that the only stops were for meals and replenishments of fuel and lubricant, and to unload and load in Philadelphia.

Long Freight Hauls Sure to Come.

Many of the mills are considering the use of trucks to make hauls of considerable distance, as the congestion of railroads precludes dependency on either freight or express, and as truck delivery between shipping point and destination is with only two handlings and there is not the need of special packing, there is decided economy when labor cost is considered. Besides this, the saving of time is extremely important. A truck can make a trip of from 100 to 150 miles in a day and haul a full load the entire distance. Express shipments will require days and freight very often weeks. As a matter of fact freight can be carried profitably by truck for approximate express rates.

Manufacturers of large experience are firmly convinced that even if there is no lessening of transportation cost through the use of trucks there is so large an element of reliable service that investment is fully justified. There is undoubtedly a very large market for trucks in the textile industry, for the possibilities are hardly realized by manufacturers and the salesmen who are qualified to practically adapt machines to afford all of the practical economies are as yet comparatively few.

BIG DECREASE IN TRUCK EXPORTS.

The number of trucks exported in December declined from 1331 in November to 825, and the valuation was \$1,585,481, as compared with \$3,689,314 in the preceding month. Of the total exported the United Kingdom took 219 only. No trucks were shipped to South America.

The total trucks exported during 1917 was 14,347, against 18,903 in 1916, and the value was \$36,364,773, against \$52,870,774 in 1916.

CONTRACTS FOR CLASS AA TRUCKS.

Contracts for assembling Class AA trucks for government purposes are to be issued by the Motor Transport Section of the Quartermaster General's Department at Washington, generally following the system adopted for contracting for class A machines. The manufacturers will deal directly with manufacturers of parts and units, but the government bought the parts and units for the Class B trucks and supplied these to the assemblers.

NEW IHC DISTRIBUTOR IN NEW YORK.

The Philadelphia branch of the International Harvester Co. of America has appointed the Whiting Motor Co., 1802 Broadway New York City, with a branch at 352 Central avenue, Newark, N. J., distributor of IHC motor trucks in Greater New York and Essex county, New Jersey.

The Whiting Motor Co. is well established and well known in New York City and Newark, with well equipped sales and service stations, and can supply IHC truck chassis with a type of body suitable for every business requirement.

PACKARD TRUCK PRICES ADVANCED.

The prices of Packard trucks have been advanced, that of the four-ton \$125 to \$4450, of the one, 1½, two and three-ton trucks \$200 each to \$2650, \$3000, \$3400 and \$4100 respectively, and of the five and six-ton trucks, \$250 each to \$5150 and \$5400 respectively.

A plant is to be built at Appleton, Wis., by the Reliance Motor Truck Co., formerly the Racine Motor Truck Co. The first unit, 75 by 300 feet, will be completed about May 1.

TWIN CITIES SHOW HUGE SUCCESS.

At the Twin Cities automobile show at Minneapolis, participated in by dealers of that city and St. Paul, a great deal of interest obtained in the truck department. The show was in the Overland building, which has 236,000 square feet of floor area. The section given over to trucks was 160 by 200 feet and in it 24 different makes of trucks and four conversion units were shown. The attendance during the week is stated to be upwards of 175,000. The machines exhibited included Selden, Pierce-Arrow, Republic, GMC, Acme, Peerless, Ford, Packard, Dodge, Oneida, Fulton, Diamond T, International, Nash, Maxwell, Bessemer, Tiffin, Reo, Federal, Studebaker, Menominee, Wilcox, Maxfer and Denby, and Utility, Graham, Louke-Douglas and Kelly conversion units.

KEMP TO SELL KINGSTON SPECIALTIES

William E. Kemp, 1731-37 Broadway, New York City, distributor of Kingston specialties, will handle the distribution of products of the Byrne, Kingston & Co., and Kokomo Electric Co., Kokomo, Ind., throughout the New England territory. Under this new arrangement more efficient repair and delivery service will be afforded the users of Kingston carburetors, magnetos, spark coils, spark plugs, switches and other products.

A large stock and repair station will soon be established in Boston which, in conjunction with the large well stocked Kemp service station in New York, will make possible a greatly improved service on Kingston products.

GARFORD HEADS ROAD BUILDING COMPANY.

A. L. Garford of Elyria, O., is president of the Ohio Permanent Roads Construction Co., formed at Toledo, O., with capital of \$1,750,000 to engage in road building. The stock is divided into \$500,000 preferred and \$1,250,000 common. It is the Ohio subsidiary of the Permanent Roads Construction Co., and the purpose is to construct highways with a new material and with special machinery, which are said to build roads that are extremely enduring for a very moderate price. The operations of the company are to be begun as soon as weather will permit.

CHICAGO FENDER ORDINANCE SUSPENDED.

The fender ordinance enacted by the Chicago city council has been suspended until March 1 pending a decision in a test case before Master in Chancery Sigmund Zeisler. The police department has been instructed to enforce the ordinance beginning Feb. 1. The test case, if adverse to truck owners, will be carried to the State Supreme Court, according to statement made by the Motor Truck Owners' Association, which is prosecuting it.

NEW KOEHLER TRUCK AGENCIES.

The H. J. Koehler Motors Corporation, Newark, N. J., makers of the Koehler 1½-ton truck, has announced the appointment of the following new agencies: Pittsburgh Motor Sales Co., 5920 Penn avenue, Pittsburgh, Pa.; Bailey's Garage, Main and Mechanic streets, Westfield, Mass.; Baker-Riedt Motor Co., McAlester, Okla.; L. S. Lerch, Easton, Pa.

WELCH FRUEHAUF WESTERN MANAGER.

J. Welch, formerly associated with the Abbott Motor Co. of Cleveland and the Interstate Motor Co. of Muncie, Ind., has been appointed western manager of the Fruehauf Trailer Co., with headquarters in Kansas City, Mo.

The factory at York, Pa., purchased by the Bell Motor Car Co., from the Pullman Motor Car Co., will be devoted to building a 3000-pound truck driven by internal gears, which will have optional wheelbase of 112, 124 and 136 inches.

PAIGE MAKES OFFER TO BUY SIGNAL TRUCK CO.

Owners of trust certificates of the Signal Motor Truck Co., Detroit, Mich., have been offered cash prices for them by C. P. King and W. K. Hoagland, voting trustees of the Paige-Detroit Motor Car Co., for the purpose of taking over the assets and the business of the truck company, paying approximately the value of the company's sound assets. Explanation is made that should the sale be made the owners of the Signal company's preferred stock will be entitled to an amount not exceeding \$106 a share and accrued dividends, but such sale is conditional upon the consent of the holders of common stock, who would expect some remuneration. The offer proposes to the stockholders opportunity to authorize the sale, and authorize the company to deliver to holders of common voting trust certificates warrants entitling such holders to payment at the rate of \$1 a share, the remainder of the proceeds to be divided pro rata among the holders of preferred stock under warrants similar in form as their interests may appear at the time of distribution.

TEN-TON SEMI-TRAILERS.

Two 10-ton semi-trailers, equipped with Wood hydraulic hoists, designed for the service of Scribner & Morrow, Coal Valley, Pa., near Pittsburgh, Pa., were recently delivered, being driven over the road coupled to Acason tractors. The semi-trailer bodies are 12 feet long, seven feet wide and four feet deep, constructed of wood and sheathed inside with steel. The drive was made during adverse weather conditions and the machines made very good time. Statement is made by H. C. Fruehauf, general manager of the Fruehauf Trailer Co., Detroit, the builder, that these trailers can be hauled easily by 3½-ton tractors and thus triple the capacity of the hauling unit. That the company has clearly demonstrated that transportation costs can be reduced from 50 to 200 per cent. in coal haulage and save time as well, which are most important factors.

SELDEN TRUCKS AT BOSTON SHOW.

Because of insufficient space to make satisfactory exhibition at the Boston show, the Selden Truck Sales Co. will show a full series of all Selden trucks built at the private show rooms of the Baker Motor Sales Co., Inc., 400 Massachusetts avenue, Cambridge, Mass., and during the show week the Selden headquarters will be at the Hotel Copley-Plaza.

A motor 'bus will be operated by the Selden company between Mechanics' Hall, the Copley-Plaza and the sales-rooms of the Baker Motor Sales Co., and no charge will be made for transportation of those who desire to consult officials of the Selden company at its headquarters or see the exhibition of trucks. All Selden dealers and those interested in trucks are invited to register at the Selden headquarters.

E. E. VREELAND HEADS REORGANIZED CONCERN.

Becomes President of the Abbott-Downing Co. of Concord, N. H.

E. E. Vreeland has been elected president and general manager of the Abbott-Downing Truck and Body Co., which has been incorporated and has absorbed the Abbott & Downing Co., Concord, N. H., which for more than a century has been known as a builder of highest grade animal vehicles, and for several years built power trucks.

Mr. Vreeland will devote himself actively to the interests of the company and will reside at Concord. He is treasurer of John Opitz, Inc., manufacturer of chemicals; a director of the Fulton Motor Truck Co., Farmingdale, L. I., president of E. E. Vreeland, Advertising, Inc., and president of the Vreeland Advertising Press, New York, N. Y. He was active in the Fulton company for two years, financing it and serving as treasurer and advertising manager until he



E. E. Vreeland, President, Abbott-Downing Truck and Body Co., Concord, N. H.

resigned to associate himself with the Abbott-Downing Co. The Fulton factories were built under his supervision and during the first operations of that company he purchased the materials and managed the production. As is implied by his other affiliations he has been exceedingly active as an organizer and developer of advertising and merchandising plans, having established a unique organization to engage in this work, and he is financially interested in several concerns he reorganized.

Abbott & Downing and later the Abbott & Downing Co. carried on a business founded in 1813, and its history is representative of the development of transportation in America. The first railroad cars were built in its shops, its wagons traversed practically every road, or perhaps made roads, because they were the choice of the pioneers who sought the unexplored West. The original "Deadwood" coach, driven by "Buffalo Bill," was constructed at Concord.

Concord coaches were used in considerable numbers in the South African Transvaal, in Australia and elsewhere about the world, and Concord huggies were a standard type so long as animals were the main dependent for highway travel.

As the concern kept pace with vehicular transition it began building power trucks about two years ago in 2000, 3000 and 5000-pound load capacities, and the purpose is to add 7000 and 10,000-pound sizes to complete a series of Concord trucks. One of these was taken to the Mexican border with the First New Hampshire Regiment and the service with it was from every point of view satisfactory.

Until now Concord trucks have been sold exclusively retail from the factory and a Boston branch to established trade. As reorganized the company will produce in a wholesale manner and its machines will be available to dealers and for export trade. Mr. Vreeland states that based upon inquiries received during the 18 months the engineering work of designing and testing was progressing, there can be no question of the demand for Concord trucks, for the trade and public have knowledge of and regard the prestige of the company. Several agencies have been established in cities in New England during the first few weeks of operating under the new policy. The character and standing of the dealers who have sought contracts for distributing Concord trucks is evidence that the machines will find the favor that their quality justifies. He is firmly of the opinion that the Concord reputation will be the company's most valuable asset in creating sales.

The Concord trucks will be shown to dealers for the first time during the week of the Boston show and will be exhibited at the company's Boston office at 84 Brookline avenue.

B-W AMMETER PRODUCTION.

Large numbers of B-W ammeters are being produced by the Ballman-Whittem Manufacturing Co., which has just occupied its new plant at 4440 Olive street, St. Louis, Mo. These instruments are now distributed by the Electric Appliance Co., Chicago, Ill.; Alexander-Seewald Co., Atlanta, Ga.; Ozburn, Absten & Co., Memphis, Tenn.; W. H. Wheeler Co., Indianapolis, Ind., and the Sharp-leigh Hardware Co., St. Louis, Mo. The company is managed by W. H. Martin, formerly of the Ford Motor Co.

John L. Judd, 685 Beacon street, Boston, Mass., has made contract to distribute Columbia tractors and semi-trailer units, built by the Columbia Motor Truck and Trailer Co., of Pontiac, Mich. He will have a large exhibit of this equipment at the Boston Automobile Show.

After March 1 C. H. Tammany, New York distributor for Larrabee-Deyo trucks, will occupy a new building he has leased at 315-7 West 47th street as a salesroom and service station.

TITAN SPECIAL HEAVY DUTY TRUCK



Titan Special Duty 5-6 Ton Heavy Duty Truck Equipped with a Platform Body, Carrying a Load of Cement.

CONVENTIONAL from the fact that nothing embodied in the design has not been proven by service experience, but with units having exceptionally large factors of safety, the Titan truck, built by the Titan Truck Co., Milwaukee, Wis., is constructed especially for heavy haulage, such as freightage and contract work. Claim is made by the company that after long investigation of the uses made of trucks in army service, both in this country and abroad, and careful study of constructional requirements to obtain high efficiency, long endurance and low operating cost, a special type that was believed would have every desirable mechanical and service quality was decided on and designed. This will be produced exclusively by this concern. The name Titan was adopted as typifying the work that could consistently be expected from these machines.

Every part or unit in the Titan truck, which has load capacity of 10,000-12,000 pounds, is produced by a specialist from special metal, designed and proportioned to have extreme strength and endurance. Nothing has been selected that does not measure to the high production standard. The frame is constructed of special alloy steel channel section eight inches wide, with three-inch webs, from quarter inch stock. All brackets and close members are secured with S. A. E. bolts instead of rivets, because of obviously greater strength and higher quality, better bearing on the frame, and that they can be tightened whenever necessary. Because rivets are necessarily soft metal they wear themselves and

the parts, may shear, and must be replaced with larger sizes, and the replacements cannot be made without special tools. Bolts can be tightened with a wrench at any time and place. As a security against destructive wear a considerable advantage is claimed for the use of bolts, while the labor saving and economy by insuring against mechanical deterioration is maintained to be a material factor for a buyer to consider.

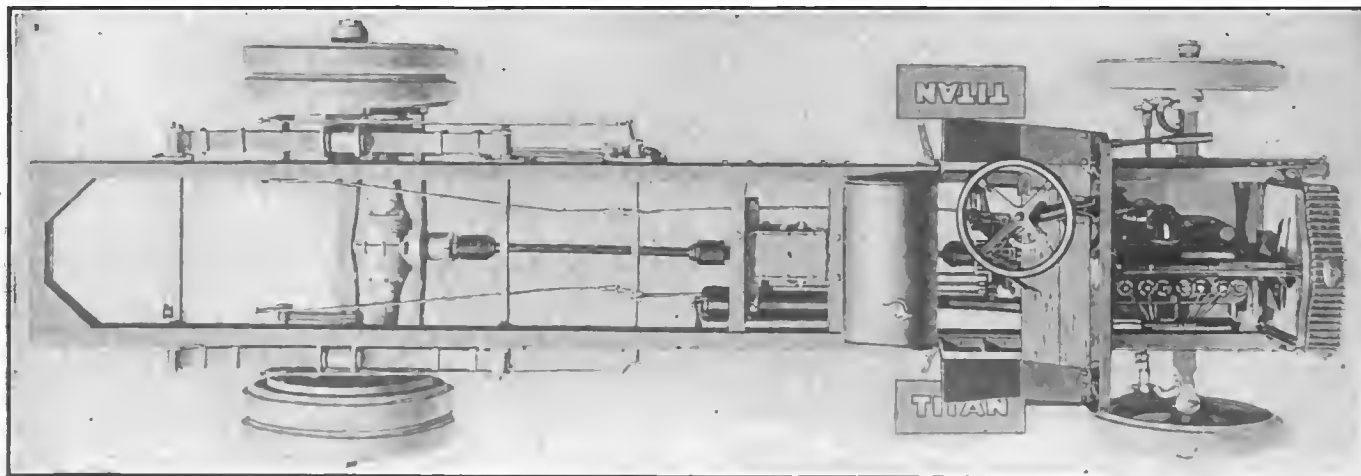
The chassis is powered with a Buda engine having $4\frac{1}{2}$ inches cylinder bore and six-inch stroke, which is rated by the S. A. E. formula at 32.40 horsepower, but will develop 40 horsepower at 1000 revolutions and 57.50 horsepower at 1750 revolutions by dynamometer test. This is ample power for any work that might be required, and it is applied through a selective type gearset mounted amidships by a large tubular shaft to a Clark (Celfor) internal gear rear axle. The load is largely carried by the dead member of this axle and the jackshaft has no stresses upon it.

The engine is the largest size built by the Buda company and is designed purely for truck construction. It is a four-cylinder, four-cycle, water cooled, L head vertical type, with the valves at the right side. The cylinders are cast en bloc with the water jacket integral and the water jacket head open above the cylinders. This is covered with a large plate, retained by studs, that carries the outlet manifold. The design is such that there are liberal water chambers above the cylinders and the passages are thoroughly freed, so that there is positive circulation of water. The water enters the jacket directly under the valves, this insuring thorough cooling.

The blocks are cast of gray iron, and after testing by water pressure are rough bored, machined, aged, reamed and ground, after which they are again tested for defects. The pistons are cast from similar material and are turned and channeled for three compression rings, and are cut with oil recesses. The piston rings are fitted with much care and are ground to obtain great accuracy.

Other Details of Engine Construction.

The crank case is cast in two sections from gray iron, the upper having a vertical transverse web that carries the centre main bearing, and both have forward extensions that form the housing for the timing gearset and rear extensions that



Plan View of the Titan 5-6 Ton Heavy Duty Truck, Showing the Construction of the Frame and the Power Transmission System from Engine to Rear Axle.

form the bell housing for the flywheel. In the lower section a steel plate is placed that is the base for the crank chamber and the top of the oil reservoir. The crankshaft is a drop forging from special alloy steel, heat treated to have a tensile strength of 120,000 pounds to the square inch and an elastic limit of 85,000 pounds to the square inch. This is machined and ground to size. The journals are respectively $2\frac{1}{2}$, $2\frac{1}{4}$ and $2\frac{3}{8}$ inches diameter from front to rear, and in the same order are $3\frac{1}{2}$, $3\frac{1}{4}$ and $4\frac{1}{2}$ inches length, a total length of $11\frac{1}{4}$ inches. The crankpins are $2\frac{1}{2}$ inches diameter and three inches length.

The camshaft is a steel drop forging with the cams and the timing gear flange integral. This is mounted on three journals. The shaft is case hardened and carefully ground to obtain exact cam contour. The connecting rods are steel drop forging, the caps being retained by four nickel steel bolts each. The wristpins are steel tube, hardened and ground, that are secured in the piston bosses by locked cap screws. The main and crankpin bearings are babbitt mounted in bronze cages that are adjustable with shims, and the camshaft bearings and the bushings for the small ends of the connecting rods are phosphor bronze. The timing gears are helical cut, much care being taken to obtain accurate gear centres, and thrust screws insure against end play of the gears or the shafts.

The valves are cast iron heads electrically welded to steel stems, perfectly ground and interchangeable, and these are actuated by mushroom type tappets that are fitted with adjusting screws and locking nuts. Both the valves and the tappets operate in long guides that are renewable when worn. The valve mechanism is enclosed and protected from water and abrasives by easily removed cover plates.

Engine Cooling and Lubrication.

The engine is cooled by water circulated through the jacket by a centrifugal pump having a bronze impeller and bronze bearings, and a large radiator with a cellular cooling section mounted in a cast metal case, that is carried on the front cross member of the frame. Radiation is promoted by a fan mounted on ball bearings on an adjustable bracket on the forward end of the block that is driven by a flat belt from a pulley on the water pump shaft.

The engine is lubricated by a self-contained positive pressure type, with a pressure regulating valve. The oil is drawn, after filtration, from the reservoir by a geared pump and forced through ducts to the main bearings, thence through channels in the crankshaft to the crankpins and then through tube to the wristpins; the camshaft bearings are also fed through ducts in the crank case. The lubricant thrown from the crankpins by centrifugal force is adequate for the cylinders, pistons and cams and tappets. The timing gearset has a constant oil bath that drains from the forward main bearing. The drainage from the various portions of the engine reaches the base of the crank chamber and flows to the reservoir for recirculation. The oil pump and filter can be removed from the bottom of the crank case without dismantling the engine.

Engine Auxiliaries and Suspension.

The fuel is supplied through an automatic float feed carburetor that is stated to be very efficient. The source of ignition current is a Bosch high-tension magneto. The engine is equipped with a Simplex governor by which the maximum speed is held to 11 miles an hour. The equipment also includes a generator and a battery that supply current for the electric dash and tail lamps. Assembled with the engine and enclosed in the bell housing is the dry disc clutch. This can be adjusted by the removal of a cover plate. It is easily lubricated and requires little attention.

The engine is mounted on three points—on a trunnion carried in a bearing on the front cross frame member, and by arms at either side of the flywheel housing on the chassis frame side members. The radiator is suspended on springs by frame trunnions. The capacity of the cooling system is 10 gallons, so there is no probability of overheating. The clutch shaft is coupled to the main shaft of the transmission gearset, with a universal joint at either end. The gearset is a selective individual jaw clutch type, having three forward speed ratios and reverse, which is carried on three points between

two frame cross members. The shafts and gears are very large and are $3\frac{1}{2}$ per cent. nickel steel. The gears are constantly in mesh and cannot be stripped or worn from changing speed ratios, and the shifts must be positively made.

The Power Transmission System.

The entire power transmission system is amply protected from cramping or side pressure stresses from chassis distortion and there is no possibility of loss of power. The drive from the gearset to the rear axle is through a large tubular shaft and two seven-ton capacity universal joints, and by special design what is in practise a straight line drive has been obtained, further insuring against power losses. The rear axle is constructed with a nickel steel dead member and the jackshaft has nickel steel gears. The internal gears are housed completely and the enclosing drums are packed with grease to insure lubrication. The axle spindles are very large and the carrying bearings are maintained to be larger than are those of any other truck of the same rating of different drive. The axle has 16 inches road clearance and the weight is claimed to be from 850 to 1000 pounds lighter than worm drive axles of similar capacity. The front axle is a heavy nickel steel drop forging with steering knuckles of unusual size, equipped with generous bearings.

The frame is suspended on springs that, while classed as semi-elliptic, are practically flat when loaded. The spring horns are unusually deep to obtain clearance. The rear springs and the rear ends of the front springs are shackled, but there is less shackle movement than with conventional types because of the form of the springs. The front springs are 48 inches length and three inches width, and the rear set is 60 inches length and $3\frac{1}{2}$ inches width. The rear spring brackets are fitted with tie rods that prevent spreading or frame distortion from road shock. The torque is taken by the springs, but the propulsion is through radius rods, so mounted as to have universal action and, when the truck is loaded, these are practically horizontal and the driving thrust in a straight line with the shaft.

Steering Gear and Brake.

The steering gear is at the left side and it is extremely heavy and built to be easily adjustable. The linkage is behind the front axle to protect it from contact with road obstructions. The wheels are cast steel, for which claim is made that they are lighter than wood wheels and are not affected by climatic changes. These are shod with solid tires, the forward set being 36 by six inches and the rear set 40 by six inches dual. The control is by foot pedals for the clutch and service brake, with hand ignition and throttle control levers on the steering column and the gear shifting and emergency brake levers in the centre of the footboard. The brakes are internal expanding within drums $29\frac{1}{2}$ inches diameter on the rear wheels and are said to be exceptionally powerful. The levers are very long and the linkage is designed to afford direct pull upon them. As the radius rods and the propeller shaft are of the same length and angle there can be no change of brake action with variance of the load.

The chassis was designed with a view to having full accessibility and simplicity, and much attention has been paid to details of construction. All the spring bolts, which are claimed to be the largest in any machine of equal capacity, are fitted with wick oil reservoirs and oil cups, and care has been taken to obtain full lubrication of all wearing parts. All of these components are fitted with bronze bushings, that may be renewed when worn, and those in the clutch housing and in the brakes are oilless types, which is insurance against wear.

The chassis with full equipment is sold for \$5000 f. o. b. at Milwaukee.

FIRST CLASS AA TRUCKS TESTED ON ROAD.

Four Class AA trucks, load capacity 1500 pounds, built by the Willys-Overland Co., Reo Motor Car Co., Maxwell Motor Co. and the Federal Motor Truck Co., reached Washington Feb. 12, being driven from the factories. The speed overland averaged about 18 miles an hour and the fuel consumption was about a gallon for 10 miles.

PRODUCER OF GAS FUEL FOR TRUCK USE

By S. R. WILLIAMS.

AT WEST PARK, O., was recently developed by E. A. West and E. E. Parsons an oil gas producer for automobile vehicle engines which is quite revolutionary in some of its features. The most important of these features being that using either crude oil or kerosene as fuel the engine is made to start on its own fuel and is entirely independent of temperature conditions in starting. To drivers of auto trucks whose only starting device is a crank, the possibility of starting an engine in cold weather, just as readily as in the summer, will make a most favorable impression.

At the outset it is to be emphasized that the device invented and patented by Messrs. West and Parsons is not a special form of carburetor. It is a producer of gas from crude oil or kerosene and the gas thus formed may be carried any distance to an engine and there properly mixed with air used as a fuel

considers the price per gallon for the two fuels and the relative amounts of the two used, this makes a splendid showing for this new gas producer on the passenger car.

Developed for Motor Truck Use.

At present, however, the producer is being developed particularly for motor trucks, where the matter of fuel is so important from an economic standpoint. The producer was first tried out on a 1½-ton motor truck over pavings and roads to which the ordinary motor truck would be subjected. The motor truck equipped with this gas producer has shown power sufficient to handle its load under all conditions.

The simplicity of the gas producer will at once commend itself to the engineer. In Fig. 1 is shown a vertical cross section of the small gas plant. Through a needle valve, O, the oil is admitted to the producing chamber, C, where it drips down on the heating coil, H. This heating element is removable

operation by an induction coil. After starting conditions are obtained the oil as it comes in through O comes in the form of a fine spray and it is in this condition that as it sprays through the flame in the producing chamber, C, the oil is cracked and formed into gas. There is a very small amount of the oil used in producing the gas. The temperature of the chamber, C, is regulated by the adjustable screw valve, S, which admits air.

How the Gas is Made Inflammable.

In order to put out the flame as the gas is drawn forward toward the mixing chamber, M, it is drawn through a fire extinguisher, consisting of a series of plates with openings out of alignment. This fire extinguisher shown in B, Fig. 1, and in more detail in Fig. 2, acts on the same principle as the wire gauze about the Davy's safety lamp for miners' works, it reduces the temperature of the gas below the point of ignition.

Beyond the fire extinguisher, B, the gas goes to the mixing chamber, M, Fig. 1. The section marked P could be an extended length of pipe so that the outfit thus far described is simply the producer and the mixer, which is next to be described, may be the mixer on any gas engine or the mixer on a gas stove or light. There is no feature of a carburetor here except insofar as mixing is done in a carburetor.

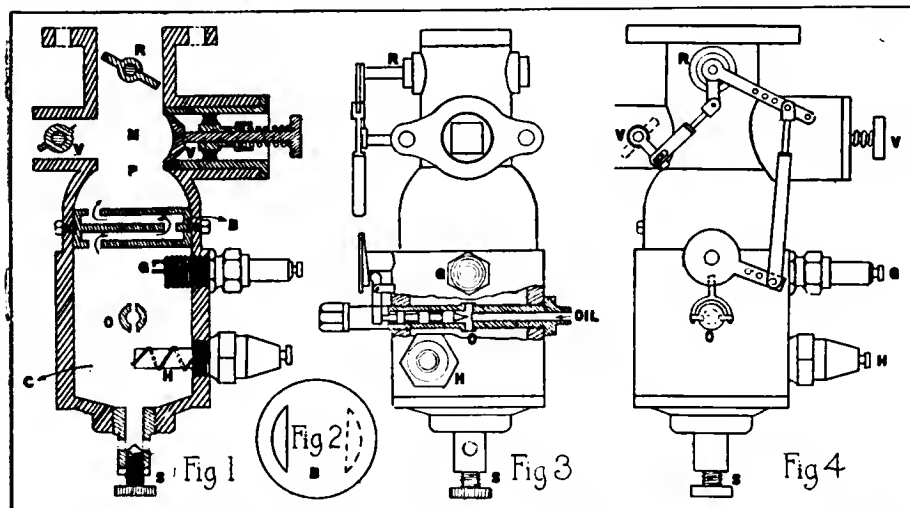
Through the butterfly valve, V, and the automatic valve, V, the proper amount of air is admitted into the mixing chamber, M, Fig. 1, and mixed with the gas as it comes from the producer. By means of the control valve, R, the gas properly mixed with air is then passed through the manifold to the cylinders of the engine.

In Fig. 3 is shown a vertical transverse section of the gas producer and mixing chamber with greater detail of needle valve opening O, where the oil enters the producing chamber, C. Fig. 4 shows the exterior of the gas plant and the mechanism for starting the feed supply and the control valve, which work synchronously.

How Efficiency is Increased.

The question may at once be raised, where does the increase in efficiency come in, as between an engine fitted with the above described gas producer and one fitted with an ordinary carburetor? In the theory of heat engines we have an expression for the efficiency of the engine in terms of the absolute temperature at which the working substance is used in the engine and the temperature at which it is exhausted. The greater this difference can be made the greater the efficiency. This can be done in two ways, either by making the temperature of the working substance, when it is used, higher, or else lowering the temperature at exhaust.

The claims of the patentees are that in the producer a much larger percentage of gasification is obtained than is



The West-Parsons Gas Producer: Fig. 1, Cross Section of the Producer; Fig. 2, Diagram of Fire Extinguisher of the Producer; Fig. 3, Vertical Transverse Section Showing Detail of Needle Valve; Fig. 4, External Drawing That Shows the Control Members.

for the engine just as any gas engine would be handled. Not only may the gas be used in an engine, but it may be piped away from the producer and used in buildings for heating and lighting purposes.

The gas producer has the characteristic of a gas producer that a small portion of the fuel is used in producing the gas. On account of the crude oil or kerosene being dirtier to handle than gasoline the larger field of usefulness for this producer seems now to be on the motor truck, although its wonderful efficiency has been demonstrated on an ordinary six-cylinder passenger car which has been run about 9000 miles. This car, equipped with an ordinary carburetor, had a mileage of 14-16 miles per gallon of gasoline, while with the gas producer of Messrs. West and Parsons replacing the carburetor and using the poorest grade of kerosene the same car made a record varying from 18-26 miles per gallon of kerosene. When one

like a spark plug, so that if it gives out it is easily replaceable. One end of the coil is grounded on the frame of the producer and the other end is connected to the battery in the same way that a spark plug is. The coil is wound on an insulating material with depressions in the insulator for retaining the oil and when the coil is heated by an electric current the oil vaporizes and flies the chamber, C. The spark plug, G, is then started and a flame is generated in the producing chamber, C, which cracks up the globules of oil, forming a gas, which is to be the fuel of the engine.

Once the flame from the spark plug is started the current is turned off from the heating element, which is used only in starting. The spark plug, G, is kept going continuously while the engine is running, although once the flame is started it will keep going indefinitely under a constant load, but to make sure that there is always a flame under a varying load the spark gap, G, is kept in

procured from gasoline in the ordinary carburetor. Hence at the time of an explosion nearly complete combustion takes place, giving a higher temperature at this point, and, consequently, more energy can go into the impulse given to the piston of the engine. There is practically no slow burning combustion following the explosion in the cylinder, because almost complete gasification has occurred in the producer.

The slow combustion which so often follows the explosion in a gasoline engine may be seen in the flame playing out of the engine's exhaust. This makes for inefficiency by raising the temperature of the exhaust. On a 25 horsepower, four-cylinder engine, which has been used for experimental purposes on a block, it is very significant that the exhaust pipe, which is an iron pipe painted black, the paint is not burned off at a very short distance from the cylinder after several months use under all sorts of loads. The exhaust on an ordinary car always has the paint burned off and the iron severely pitted.

Another advantage in running the engine with this producer was shown on a six-cylinder car already referred to. After 9000 miles the car was taken to the garage for an overhauling. The testimony of the workmen was that they had never taken an engine apart with the cylinders in such excellent shape. Their surfaces were like a mirror. The very small part of the oil which is not gasified in the producer is carried over into the cylinder and acts as a lubricant, because it is not carbonized by the slow combustion which usually occurs after the explosion. There is practically no carbon deposit on the spark plugs or valves and this is to be ascribed to the fact that almost complete gasification has occurred.

It would seem, therefore, that in solving the very important problem of using the heavier distillates as a fuel for motor trucks and using it in such a way that the engine may be started with less trouble on the same fuel than can be done on the lighter distillates, that Messrs. West and Parsons have also secured results of great importance in adding to the reduction in cost of fuel and maintenance and the life of the engine.

Having been appointed to the Reserve Officers' Corps of the Ordnance Department, W. E. Blaine has resigned as truck engineer for the Packard Motor Car Co. and is now stationed at Washington.

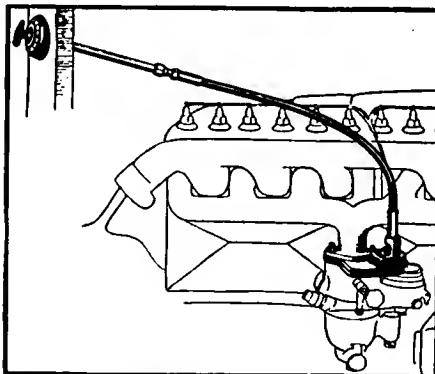
E. MacConnell, who was advertising manager of the Detroit branch of the Goodrich Rubber Co., has joined the sales engineering staff of the Hyatt Roller Bearing Co. at Detroit.

The sale of Atterbury trucks in Missouri, Illinois, Iowa and Wisconsin is now directed by J. G. Jackson, district sales manager.

A large order for trailers for use abroad with trucks has been placed with the Columbia Motors Co., Detroit, Mich.

THE COMCO AUTO LOCK.

Every owner desires to insure against the theft of his vehicle if left unattended. The Comco Auto Lock, made by the Combination Auto Lock Co., St. Louis, Mo., is designed for practically any machine and requires no key to un-



Comco Auto Lock.

lock it. With this device locked a gas mixture cannot pass from the carburetor to the engine, for a slide valve closes the intake passage entirely. To open it is only necessary to turn the knob on the dash to a prearranged set of numbers, and the valve is opened. More than 250,000 combinations are possible according to the manufacturers, so that the chances of hitting on the proper combination by an unauthorized person are very remote.

For ordinary applications the lock is bolted between the carburetor and intake manifold and forms a part of the equipment. A flexible shaft connects the lock with an indicator dial on the dash, which may be operated in the dark if necessary, once the driver knows the proper combination.

An order for 20,000 Distel wheels is to be filled by the Detroit Pressed Steel Co. for equipping 1½-ton trucks for the aviation section of the United States army.

A special department has been organized by the Link Belt Co., Indianapolis, Ind., to sell drive chains for trucks to jobbers, dealers or retailers.



Plant of the Fuller & Sons Mfg. Co., Kalamazoo, Mich., Makers of Automobile Parts, Specializing Transmissions and Clutches.

DIXON LUBRICATION CHART.

The value of lubrication to such an intricate piece of mechanism as an automobile cannot be overestimated. Many inexperienced drivers and owners think that the process of lubricating an automobile consists of applying oil to all open crevices, or holes, but pay no attention to the quality of lubricant, a rather impractical and costly treatment for a machine costing many hundreds of dollars.

Graphite has long been acknowledged as an ideal lubricant for hearing surfaces, and the Dixon graphite lubricants are well known. This company has developed its products to perfection, and to assist motorists they have issued a lubrication chart on this important subject, which will be sent free of charge upon application to the Dixon Graphite Works, Jersey City, N. J.

WILL DOUBLE PRODUCTION.

The plan of the Larrahee-Deyo Truck Co., Binghamton, N. Y., is to double its production during 1918. The company has increased its capital from \$80,000 to \$300,000. The series of trucks will be completed by the construction of a fifteen-ton size. Last year the company increased its business 210 per cent. and the prospect for the coming year is regarded as excellent.

BARGER TRUCK CO. FORMED.

A four-wheel drive truck is to be built by the Barger Truck Co., which has been formed at Indianapolis, Ind., by Henry W. Barger, Olga Barger and Walter Brevet, with capital of \$50,000. The directors are the three incorporators. The company expects to begin operations at once.

The Republic Motor Truck Co., Alma, Mich., has appointed H. F. Harris industrial engineer. He was formerly assistant manager and comptroller at the New York branch of the Willys-Overland Co.

CLOSE COOPERATION FOR CONTROL OF OIL INDUSTRY.

Dr. H. A. Garfield, United States Fuel Administrator, and M. L. Requa, the recently appointed head of the oil division of the fuel administration, following a meeting of the petroleum war service committee, stated it was the desire of the fuel administration that the men representing the petroleum industry should cooperate fully with and give to the fuel administration the benefit of their knowledge to the end that whatever control is to be exercised shall be only after full knowledge of all phases of the problem shall be obtained by an intelligent and constructive study.

It was also indicated following the meeting that it was not the intention of the fuel administration to take up at present the question of price fixing, but that a general survey of the whole industry would be made in cooperation with the various branches thereof, with a view to determining what action the government might take to assist in supplying more effectively the necessary fuel for war purposes and to provide and arrange for the supplies of fuel oil necessary for the various industries at home.

Mr. Requa stated that it was his desire that the petroleum war service committee should for the present continue its activities without change, to the end that there should not be any interruption in the continuous flow of petroleum products to the Allies or for our domestic uses.

RUSSEL AXLE MAP OF THE BATTLE FRONT.

The Russel Motor Axle Co., North Detroit, Mich., has issued a neat folder in the form of a map of the battle front in France and Belgium, showing the old and new battle lines. It is a very complete map, and as it specifies the names of places, waterways, forests and elevations, is valuable as a reference.



Federal Truck Used for Distribution by a Butte, Mont., Dealer in Lubricants, Driven About 45 Miles Daily in Making Five Trips.

USED TRUCK MARKET REPORT.

The Chicago Automobile Trade Association has issued its first volume of a service entitled the "National Used Truck Market Report," which contains 98 pages and is bound in a durable pliable cover. It is pocket size and the contents show consecutively the model, year, capacity in tons, engine (name, cylinders and S. A. E. horsepower), transmission gearset (name, type and speed ratios), makers of front and rear axles, final drive, kind of tires, chassis list price and the "as is appraised" value of every truck manufactured in average condition, covering all makes from 1912 to date inclusive. The service is available by subscription only. An offer of 10 days' inspection is made to all readers of MOTOR TRUCK, who will address the association at Michigan avenue and 22nd street, Chicago.

COST OF ARMY TRANSPORT.

In the supplemental estimates sent to Congress by Secretary of War Baker, covering the needs of the War Department for the fiscal year ending June 30, the item of \$202,500,000 submitted as additional needs for transportation of army and supplies, is taken as an indication of increased expenditures for motor vehicles. The total budget presented in the supplemental estimates was \$1,278,513,907.20, of which amount \$692,953,500 is for the Quartermaster Corps.

TRUCKS CARRY PASSENGER CARS.

A caravan of 53 Maxwell one-ton trucks, each carrying a Maxwell passenger car, recently arrived in Chicago from Detroit consigned to the Harry Newman-Stratton Co. The driveaway was conducted by Ray MacNamara and the entire 106 machines arrived at the destination in perfect condition. It was the largest driveaway ever made between Detroit and Chicago.

TRUCK OIL DISTRIBUTION.

Wherever routes are of considerable length the distribution of fuel and lubricating oils is made with power trucks, for oil refiners and dealers have been taught by experience that speed and load capacity are the principal factors in haulage. The utility of trucks as compared with animals has been so completely demonstrated that horses are the exception to the rule so far as equipment is concerned. The customers want quick delivery and the distributors meet this demand with more trucks.

The accompanying illustration shows a 3000-pound Federal truck operated by the Texas Petroleum Products Co., Butte, Mont., which makes an average of five trips and 50 deliveries daily, covering about 45 miles, the total tonnage being 7½. The machine consumes a gallon of gasoline for every seven miles driven and a pint of lubricating oil for every 35 miles. The average daily cost of operation is \$8.10, which is about 20 cents a mile and \$1 a ton for freight carried, roughly figuring.

SAMPLE TRUCKS IN WASHINGTON.

The first three samples of the class A standardized war trucks which were driven overland to Washington from the factories are being used for testing purposes.

The Denby Motor Truck Co., Detroit; the White Co., Cleveland, and the Autocar Co., Ardmore, Pa., each made one of the trucks. The Denby product was driven over the road to Cleveland, where it joined the car made by the White company. Both cars then proceeded to Ardmore, where they were joined by the truck produced at the Autocar works, and all three proceeded to Washington, averaging 5.3 miles to the gallon.

POWER HOIST FOR FORDS.

Samuel W. Prussian of Cambridge, Mass., owner of the Guaranty Truck Co. of that city, has taken out a patent on a power hoist to be used with a truck conversion unit driven by a Ford power plant. A Ford chassis fitted with a Guaranty two-ton unit and equipped with the Prussian hoist, was recently driven from Somerville to Boston, a distance of five miles, with a load of two tons of coal. The trip was made and coal delivered within half an hour from the time the start was made. The hoist is simple in construction and easy to attach to the Ford transmission.

LOCOMOBILE HONOR ROLL.

The roll of honor of the factory force of the Locomobile Company of America, Bridgeport, Conn., is made up of 335 names, which is about 17 per cent. of the employees. Included in it are two majors, three captains, 14 lieutenants and three ensigns, and besides these a lieutenant colonel and a major were recently connected with the company.

NATION MUST TURN TO TRUCKS TO SAVE BUSINESS.

Railroad Congestion Stagnating Industry and Commerce—Highway Haulage, Controlled by Those It Serves, Efficiently Operated, Will Reduce Emergent Prices, Obtain Economies and Give Transportation the Needed Speed to Win The War

Unless highway haulage is coordinated to a plan operated through the nation no material progress can be made in obtaining the vitally needed reduction of railroad congestion.

Organization of the business interests of the country to afford precisely the service needed in any locality is the primary object of the proposition made by MOTOR TRUCK.

WHATEVER the needs of the government for railroad transportation, these must be met that the war with Germany can be prosecuted. No one can question this conclusion. With the advent of spring there will be a great movement of troops and supplies to the Atlantic seaport, whence these will be sent to Europe. Nothing can be permitted to interrupt the operation of trains doing this work. Speed will be a very potent factor and this can only be obtained by denying the use of cars, trackage and crews to all else.

When these demands have been met attention can be directed toward supplying the people with food and fuel. Next will be industrial necessities, the handling of raw and finished products. For shipping abroad the movement of freight will be from the interior to the coast, but to meet other requirements the railroads will be operated in all directions and all sections of the country. Embargoes can restrict tonnage and proposal is made to so greatly increase the passenger fares that the general public will be limited in travel to actual necessities.

The conditions pointed out are not stated to alarm the people, but to emphasize how great are the burdens upon the railroads and how inadequate are our facilities, even when thoroughly organized and coor-

ordinated, to the real needs of the nation. One will understand that the United States is a country of magnificent distances, and despite the fact that it has far greater mileage than any other nation, the area is so large that the trains must be used much longer periods and the hauls are much greater than they are in any European state aside from Russia.

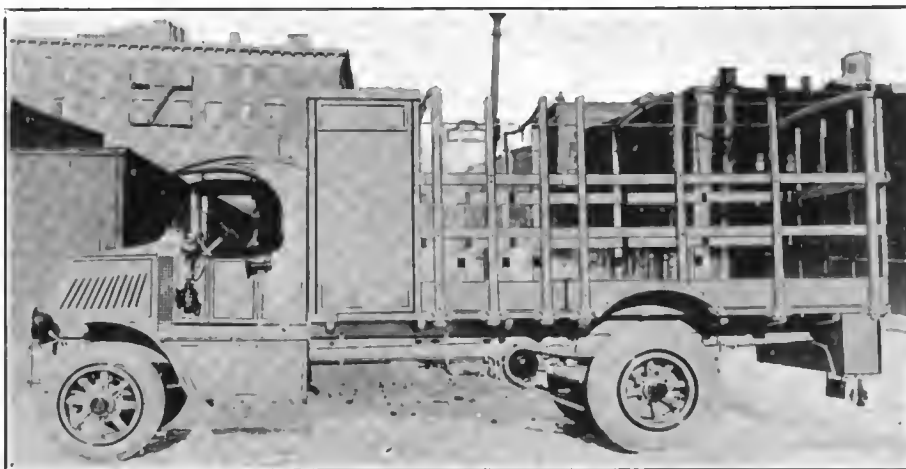
Highways Afford Only Relief.

There is only one practical relief, and that is the use of the highways, and the only limitation of this use should be the number of power trucks that are obtainable. One understands that haulage long distances with road vehicles is very costly as compared with the expense for carrying similar tonnage by railroad. The cost of carrying large tonnage in car load

lots is extremely small. It will vary, of course, very greatly, but shipments of fuel, grain and other bulk commodities will range from a half cent a ton mile upward.

No matter what the efficiency of power truck haulage and how economical the organiza-

tion, the cost will be far more than railroad transportation. Operating on a 100-mile basis, with every mile driven productive, not considering profit, and using five-ton units, the cost will be not less than 5½ cents a mile a ton, which is so much in excess of railroad haulage that it could not be considered only in times



Trucks Can Be Quickly Adapted for Practically Continuous Driving—Mack Machine Now in the Goodyear Boston-Akron Express Service.



Typical Equipment for Heavy Highway Haulage—Mack Truck and Trailer Operated Daily Within a Radius of 100 Miles of Boston.

of extreme stress. This is the bald fact and it cannot be controverted.

Which Form of Haulage Is Economical.

As has been pointed out in numerous articles in **MOTOR TRUCK**, there are lines of demarkation where actual economy is established, which are dependent upon conditions that will vary exceedingly. If time is not a factor and transportation can be done at convenience, then the means that is slowest will undoubtedly be the cheapest. By this is meant that if a freight is to be transported a distance of 50 miles, for instance, and the time required is not a factor, it can be carried by slow railroad freight much cheaper than by any other means. If however, time is important, the value of transportation will depend upon the need. If the cheapest form of haulage without reference to time, and measured by cost is obtained, the distance that trucks can be used more economically than railroad freightage is really very small. In all probability the distance is between 10 and 12 miles. The chief advantage of the truck as compared with any other form of transportation is that a load can be taken from one point and delivered to another with but two handlings, against at least four and often six, necessary with freightage by railroad, or the expense of transfer trucking.

The expense of handling is large, much larger than is ordinarily believed by those who pay for freightage. It necessarily requires time, and this cost is very much reduced by highway haulage. One should remember that in the prices quoted for railroad haulage—a half cent a ton mile for bulk shipments—and $5\frac{1}{2}$ cents a mile for truck transportation, the former comprehends a normal profit for the railroad and the latter no profit whatever, so there is a very great advantage in carrying large volume of tonnage, which is obviously not possible with any power truck or trailer unit that can be practically operated.

What has been stated applies

to large freightage, that can be carried most advantageously by railroads, so one will understand that there will never be a possibility of trucks being utilized in haulage to compete in certain work with railroads. As a matter of fact there is similar advantage existing with water lines as compared with railroads, so that these forms of transportation are absolutely safe from competition so far as long distance carrying is concerned. Obviously the railroads cannot carry freights short

distances for the same rates charged for long distances, because there will be practically the same handling, whether the haul be five or 5000 miles, and the expense of handling is a considerable part of the cost.

The main object that all business interests must consider is diversion of freight from railroads to highways that cars and trackage can be released for long hauls, so that faster time can be made with through trains, and this diversion will reduce in like ratio the freightage handled in the freight houses and terminals. No statement has ever been made as to the present excess of freight compared with normal times, but previous to the war the railroads were heavily burdened and greatly hampered by congestion. There is reason to believe that a sufficient volume of "short haul" freight can be carried by highways to so relieve the railroads that very large saving of time can be made. There is no reason to expect reduction of freight charges. As a matter of fact all of the railroads maintain that they are not now receiving the rates that operating expenses justify in demanding. One of the logical consequences of the advanced costs of operation is increased railroad rates.

No Relief Probable for Railroads.

The prospect of expansion of railroad facilities and additions to equipment are so remote that they cannot be considered. The country will need all the capital



Master Truck Transportation Co. Has Been Formed at Chicago to Operate a Fleet of 24 Two-Ton Trucks for Freightage Between That City and New York.

available for carrying on the war. Instead of improved railroads so far as trackage and rolling stock is concerned, there is the best of reason to anticipate retarded transportation because of deterioration of the roads

No work of great proportions can be accomplished without each individual having definite knowledge of his part and each following a plan that will afford positive results.

as a whole. This condition will obtain for a long time after the war ends.

The main object to be gained, aside from facilitating the operations of the railroads with reference to through trains and long hauls, is the saving of time that will result from highway haulage with trucks. Business cannot be carried on unless the needs of business men are supplied. Time is the one important factor. It is far more important than the added expense, and there can be no criticism of any plan that will facilitate business. The practical operating zones about any commercial centre are limited when pure economies are considered, and yet there is no reason why these cannot have as much as 100 miles radius.

Very Long Hauls Not Economical.

Hauling loads by power units long distances, as from Chicago to New York, can only be justified by extreme need. There would be, however, very material advantages for all business and industrial interests were trucks operated within reasonable distances and haulage demands met wherever there would be saving through minimum handling and quick service.

The plan proposed by MOTOR TRUCK in its December edition, and further considered in later issues, is entirely based on the practical use of power trucks and the utilization of the main highways connecting commercial centres. There is no reason to consider service to localities that are remote save in the event of unusual needs, and obviously the demands for highway haulage will differ in all parts of the country. While there would be variance of requirements, the principles of the plan can be applied alike, the equipment depending upon circumstances.

The MOTOR TRUCK plan for highway haulage is proposed as being in every way sufficient to meet the conditions obtaining. It is so elastic that it can be adapted to any community requirement. It proposes to so utilize vehicles that they shall be constantly pro-

The nation exists because of the organization of its people for government. Transportation can be equally well organized and directed, each unit of industry or commerce doing its "bit."

ductive. That is, no trucks shall be driven that are not fully loaded and the largest practical revenue and freightage efficiency shall be obtained.

Such a plan as has been suggested, to be generally

accepted and adopted, must be given the fullest publicity through all practical channels, including the daily and periodical press, national, state and municipal organizations, commercial and industrial bodies, and it could be explained at public meetings by speakers, for a sentiment indorsing highway haulage must be created and the urgency of the need impressed upon the people.

The request for its adoption could logically be made by the government, through the Council of National Defense, the National Chamber of Commerce, the various governmental departments and through every organization that might suggest and urge its practicality. The plan must have the approval of the government, and there must be cooperation by every state, municipality and unit of civic government.

Legislation must be enacted or agreement made as to interpretation of law, so that there will be no obstacles to the practical uses of highways in states or



Truck Equipped with Snow Plow Used by the Pennsylvania Highway Commission to Keep Main Roads Used by Trucks Open the Present Winter.

municipalities, and so far as possible the requirements of regulation should be uniform.

The plan should be carefully considered and determined so far as the principles are concerned. The details for each operating zone should be decided after the actual needs have been learned. The plan as proposed comprehends the following:

Detail for Localizing the Plan.

1—Survey to be made by every chamber of commerce, board of trade, commercial club or business men's association to obtain the following:

(a) The tonnage and character of freight received by railroad or water line from points within a radius of 100 miles by each industry or business.

(b) The tonnage and character of freight shipped by railroad or water line to all points within a radius of 100 miles by each industry or business.

(c) The average daily freight receipts and shipments of each industry or business.

(d) The tonnage of freight that must be received or shipped daily, with reference to economical conduct

The war is not prosecuted by individual initiative or independent activities. Quick and economical means for freighting are as essential to war as arms and munitions for those who fight.

of business.

(e) The tonnage of freight received or shipped where speed of transportation is the most important factor.

(f) The tonnage of freight received or shipped where speed of transportation is secondary.

(g) The tonnage of freight received or shipped that can be classified as emergent.

(h) The tonnage of freight received or shipped that could be handled in bulk, i. e., that could be hauled in full loads from point of loading to point of delivery.

(i) The tonnage of freight that could be received or shipped in less than full loads between point of loading and point of delivery (a full load to be not less than five nor more than 15 tons).

(j) If the concerns or individuals will cooperate in a plan to divert all or any part of the freight shipped, and all or any part of the freight received that can be controlled, from railroad to highway vehicles.

(k) If the concerns or individuals will make contract for a definite or indeterminate period with companies operating highway transportation.

(l) If the concerns or individuals will arrange to receive or ship freight after the customary business hours of the day.

(m) If the concerns or individuals will supply vehicle equipment for cooperative haulage.

(n) If the concerns or individuals will become financially interested in one or more companies organized to operate highway transport.

(o) If the concerns or individuals will agree to offer a part or all of its freight within a radius of 100 miles conditional upon the organization of operating companies to transport it.

Classification for Tonnage and Rates.

2—That classification be made from the reports of the tonnage of freight shipped to or received from each point within the 100-mile radius to determine:

(a) The daily average movement in either direction.

(b) The number of full loads in either direction.

(c) The number of miscellaneous loads in either direction.

(d) The tonnage where time is the main factor.

(e) The tonnage where time is secondary.

The majority of people agree that truck freighting is practical and economical. Organization cannot be accomplished quickly. There must be decision upon an operating plan if the railroads are to be relieved.

Those who fear the destruction of railroads by highway haulage have little knowledge of transportation. There is no possibility of this so long as cost is the principal factor with shippers.

(f) The tonnage classified as emergent.

3—That the railroad and express railroad rates for handling between points be classified with regard to character of freight.

4—That the cost of hauling to and from railroad terminals be established for full loads and partial loads, or a reasonable valuation be placed on the service.

5—That these data be submitted to haulage contractors, to truck owners operating fleets of machines, to service station owners, with assurance of definite tonnage to be hauled in either direction for a definite or indefinite period, with statement of approximate cost by railroad and the rates that are regarded as justified for service between points, to learn whether or not they will undertake this haulage.

Determining Vehicle Equipment.

6—That a survey be made of the power vehicle equipment of the different industrial and commercial interests within the radius that a haulage service is being considered; that the work required by each concern be determined with a view of learning the number of vehicle units that might, under a cooperative plan, be diverted to other transportation and the number that could do the work now necessary if used continuously, or at least a part of the night; that cooperation that would obviate duplication of trips, insure loads to and from all points of loading and unloading be considered; that such cooperation, if agreed upon, would be for definite rates for the hour, day or period or job, sufficient to compensate the owners of vehicles; that suitable terminals for receiving and delivering freight be located; that proposal be made to those engaged in local haulage to collect freight for delivery at and to distribute freight from these terminals; that these data be collated for the consideration of all business interests of the community; that these data be exchanged with similar bodies in other commercial centres to which freight might be shipped to or received from by truck; that the service between any two given points be based on trucks having full loads in either direction; that where full loads can be carried but one way the rates be sufficient to insure a reasonable margin above operating expense; that the cost of operating different classes of vehicles be determined by such measure or system as will be approved by the majority of owners as equitable and sufficient.

The war has been in progress nearly a year. The railroad congestion has steadily increased. Relief cannot be instantaneously obtained. Every day's delay means a still greater work to restore a normal efficiency.

Handling Freight Between Terminals.

7—That the tonnage to each point between terminals be provided for by supplementary service which will utilize such units as are best adapted, with trucks, semi-trailers or trailers; that such supplementary service rates be based upon delivery at specified terminals, the charge for collection, or delivery, or both, to be additional; that no delivery be made outside of the terminals unless a charge for this service be made based on mileage and load capacity of the vehicles;

8—That proposal be made one or more service stations to make repairs or adjustment to all vehicles operated in any operating centre, giving precedence to work on these vehicles that there be minimum delay.

9—That proposal be made service stations along the highways that will be the main channels of traffic to insure precedence for work required on freight vehicles whenever necessary.

10—That where the operations of any zones overlap that the same terminals be utilized so far as possible to obviate handling and insure against confusion in collection and distribution; that one distributing and collecting agency be used by two or more companies because of the simplification of system and organization.

Organization for Operating.

11—That service be organized either with equipment supplied by independent operators or by co-operation and systematized so that there shall be regular and dependable operations, departures being made to schedule so far as possible; that provision be made for emergency freightage by extra trips; that careful supervision be given to insure delivery on time; that there be provision made for extra vehicles in the event of accident; that special service be provided only when absolutely necessary and that adequate rates be charged for such exclusive work.

12—That each chamber of commerce, board of trade, business men's association or other organization establish a traffic bureau that shall have facilities for informing all desiring freightage the detail of the services available so far as cost, regular and special work, collection and distribution, times of departure and other necessary information is desirable.

13—That complete details of service be provided for all other organizations what might utilize these means of transportation.

14—That each chamber of commerce, board of trade, business men's association or other body maintaining such traffic bureau, by such publicity as may serve to inform the public all details that will realize for each community the fullest benefits.

15—That each operating company provide whatever insurance may be necessary to indemnify the shippers against loss in transit.

Providing for Shipping Transfers.

16—That means be taken to organize transfer of

shipments from the outward terminal of any operating company to other companies operating from that terminal, this extending the service beyond the zone and transferring the responsibility of the original company for a reasonable rate.

17—That because of the interweaving of service and division of rates imperative with operations thoroughly serving any one or number of zones, a system of record that shall be uniform be recommended by the body making appeal to the different business organizations, with a view of simplification and accurately tracing shipments or collections or establishing responsibility.

18—That the Highways Transport Committee, or other supervising or directing body, obtain from the Interstate Commerce Commission such general rulings or information as shall be desirable or necessary for the operating companies to follow; that this same body be the intermediary through which operating companies or business organizations reach the national and state authorities having to do with highway maintenance, with traffic regulation and with enforcement of law with reference to highway transportation.

19—That the needs for vehicle equipment that cannot be supplied through the regular sources be made to the Highways Transport Committee, with the expectation that so far as possible these needs shall be met through the cooperation of the power vehicle industry with the Council for National Defense.

20—That the National Chamber of Commerce shall, through its members, and to others by such means as may be deemed advisable, disseminate whatever information may be desirable with reference to operating highway transportation equipment, to methods, to policies, to facilities for varying works, to shaping public opinion with regard to legislation or traffic regulation, and to promote service generally.

21—That the Highways Transport Committee shall supply to the different business organizations, for the benefit of the public, such information as may be available with reference to service covering long distances, the rates and the data that may be practically used by shippers.

Real promotion was manifested during the Chicago-automobile show week by the Stewart Motor Corporation, which mailed upwards of 10,000 invitations to Chicagoans to visit its local salesrooms.

Statement is made that the Ordnance Department of the Quartermaster General's Department of the United States army will order 22,000 four-wheel driven trucks for army purposes.

At the Harrisburg, Pa., automobile show, held the first week in February, 14 makes of trucks were shown. About 90 per cent. of the truck dealers of the city made exhibits.

FARM TRACTOR INDUSTRY

TRACTOR SHOW AT KANSAS CITY

*Exhibition of 43 Different Makes Indoors Without Demonstration—
Several New Types Generally Following Truck Design.*



Avery 5-10 Horsepower Tractor That Is Operated by Mrs. Minnie Fitzpatrick, Engaged in Farming at Bridgeport, Neb.

REGARDED as a national event the third annual show held at Kansas City, Mo., Feb. 11-16, organized by the Kansas City Tractor Club, was of comparatively small importance. One might just as well maintain that one power vehicle exhibition was representative of the country. The number of people visiting it was not in the least indicative of interest, and surely did not reflect mechanical progression. But it served to bring together a considerable number of those engaged in the industry, several thousand persons from adjacent states who were interested from the aspect of selling, and a still greater number who were concerned in buying. The meeting of tractor manufacturers was occasion for assemblages at which the different phases of the industry were discussed, and there was a dinner at which views and opinions were exchanged and more or less unification of policies because of the broader knowledge that resulted.

The Middle West is logically the locality for engaging in tractor manufacturing from the fact that distribution can be made quicker and more economically, and more satisfactory service can be given. Shipping cost is a considerable factor in influencing sales, all other conditions being equal, and there are better opportunities for selling as compared with the disposal of machines made at greater distances. The number of buyers is relatively larger and today farmers are seeking tractors instead of tractor salesmen stalking them.

The Kansas City exhibition was decidedly interesting because it afforded

those interested in machines, either from the viewpoint of selling or buying, the best opportunity of the year to compare different makes and select which might appear to be the most satisfactory investment or best adapted to specified work. Today the tractor industry is represented by close to 225 different manufacturers, some of whom produce largely. Others have decidedly limited outputs. At Kansas City 43 different makes were shown in a building erected close to the union railroad station and very accessible for all entering the city by train.

While the percentage of the industry represented by number of makes was about 25 per cent., the percentage meas-

ured by production was much greater, for many of the exhibitors are large manufacturers, or they were represented by agents. The manufacturers as a whole may be said to be pressed extremely hard with orders, for the reason that deliveries are desired as quickly as is possible, and after the preparation of ground for spring planting there will be a very large shrinkage in demand and there will be a considerable measure of uncertainty directly following the winter and spring. The farmers will buy tractors to some extent because of their utility in harvesting and autumn work, but there will be nothing like the rapid buying that has been experienced by practically all of the industry and trade.

There are those who have undertaken to make mechanical comparisons and to analyze the engineering principles of design, but such determinations are of little value, for the conclusions of the few do not influence the manufacturers, and tractor buyers are not sufficiently versed in mechanics to justify rejection or purchase of a machine simply because it is not sufficiently like a number of other designs, either in type or principles to be regarded as standardized.

The show was principally of machines that have been seen at other shows and demonstrations, and among these were a few new makes. One of these was the R & P tractor, built by the R & P Tractor Co., Alma, Mich., which in gen-



Testing an 8-16 Avery Tractor at a Training Meet for Women War Workers at Birmingham, England, for Middlesex County. Certificates Were Awarded for Proficiency in Operating.



New Maxwell Tractor Pulling a Three-Bottom Lift Gang Plow, Cutting 14 Inches Deep, Having Drawbar Pull of from 1800 to 2600 Pounds and Using 1½-2½ Gallons of Gasoline to the Acre.

eral design follows automobile vehicle construction, the power transmission system and rear axle being built to familiar principles. It is driven by a Torbensen internal gear axle. The company producing this is composed of men identified with the Republic Motor Truck Co., and the name is made up of the initials of Ruggles and Parsons, the former being the executive of the big truck building concern.

Two types were exhibited by Fairbanks, Morse & Co., Chicago; another by the J T Tractor Co., Cleveland, O.; a fourth by the Acme Harvester Co., Peoria, Ill.; a fifth by the Automatic Tractor Co., Kansas City, Mo.; a sixth by the Beltrail Tractor Co., St. Paul, Minn.; a seventh by the Sexton Tractor Corporation, Asbury Park, N. J.; an eighth by the Trojan Tractor Co., Waterloo, Ia. Of these the J T tractor is a creeper type, as is the Beltrail, but the Acme is driven by all four wheels. The Noble, built by Noble's Automatic Tractor Co., is practically a two-wheel machine that is complete only when the farming machine is coupled to it. The Trojan, like the R & P, is driven by the two rear wheels, these being 60 inches diameter. An improved type of Parrett tractor was also shown, this having an internal gear drive that is enclosed and it has a three forward speed ratio gear-set in the power transmission system. The engine is the latest product of the Buda company.

The exhibition included the following makes:

Acme	Acme Harvester Co., Peoria, Ill.
Allis-Chalmers	Allis-Chalmers Manfg. Co., Milwaukee, Wis.
Allwork	Electric Wheel Co., Quincy, Ill.
Atlas	Lyons-Atlas Co., Indianapolis, Ind.
Aultman-Taylor	Aultman & Taylor Machine Co., Mansfield, O.
Avery	Avery Co., Peoria, Ill.
Bates	Joliet Oil Tractor Co., Joliet, Ill.
Care	J. I. Case Threshing Machine Co., Racine, Wis.
Cleveland	Cleveland Tractor Co., Cleveland, O.
Coleman	Coleman Tractor Co., Coleman, Tex.
Creeping Grip	Bullock Tractor Co., Chicago, Ill.

Emerson	Emerson - Brantingham Implement Co.
Fair-Mor	Fairbanks, Morse & Co., Chicago, Ill.
Four Drive	Four Drive Tractor Co., Big Rapids, Mich.
Gile	Gile Tractor & Engine Co., Luddington, Mich.
Happy Farmer	La Crosse Tractor Co., La Crosse, Wis.
Hart-Parr	Hart-Parr Co., Charles City, Ia.
Heider	Rock Island Plow Co., Rock Island, Ill.
Huber	Huber Manfg. Co., Marion, O.
J T	J T Tractor Co., Cleveland, O.
Lauson	Lauson Manfg. Co., New Holstein, Wis.
Leader	Dayton-Dick Co., Quincy, Ill.
Mogul	International Harvester Co., Chicago, Ill.
Moline-Universal	Moline Plow Co., Moline, Ill.
National	National Tractor Co., Chicago, Ill.
Nilson	Nilson Tractor Co., Minneapolis, Minn.
Noble	Noble's Automatic Tractor Co., Kansas City, Mo.
Parrett	Parrett Tractor Co., Chicago, Ill.
Plano	Plano Tractor Co., Plano, Ill.

Pan	Pan Motor Co., St. Cloud, Minn.
Plowman	Interstate Tractor Co., Waterloo, Ia.
Prairie Dog	Kansas City Hay Press Co., Kansas City, Mo.
R & P	R & P Tractor Co., Alma, Mich.
Rumely	Advance-Rumely Co., Laporte, Ind.
Russell	Russell & Co., Massillon, O.
Samson	General Motors Truck Co., Pontiac, Mich.
Sandusky	Daush Manfg. Co., Sandusky, O.
Sexton	Sexton Tractor Corp., Asbury Park, N. J.
Square Turn	Square Turn Tractor Co., Chicago, Ill.
Titan	International Harvester Co., Chicago, Ill.
Trojan	Trojan Tractor Co., Waterloo, Ia.
Twin City	Minneapolis Steel and Machinery Co., Minneapolis, Minn.
Velle	Velle Motors Corp., Moline, Ill.
Walls	J. I. Case Plow Works, Racine, Wis.
Waterloo Boy	Waterloo Gas Engine Co., Waterloo, Ia.
Wisconsin	Wisconsin Farm Tractor Co., Sauk City, Wis.

MUST SHIP TRACTORS NOW.

According to statements made by tractor manufacturers, who have appealed to Director-General McAdoo for the release of cars, the delivery of tractors has been greatly retarded by the shortage of railroad cars. Unless cars are supplied at once the use of the tractors on farms, where they are expected and work has been planned with assurance of delivery, will be so late that full crops will be impossible. The preparation of ground has well advanced in the Southwest and planting will continue northward uniformly, and unless the plowing and planting can be done when the conditions are favorable the crops will neither be up to the large acreage hoped for nor as productive as if the work were timed with reference to every advantageous influence.

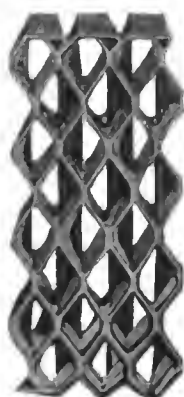


Disc Harrowing with a Titan 10-20 Tractor. Burning Kerosene Fuel. A Type Especially Adapted for General Work on Small Farms.

TRUSS-DESIGN RADIATORS

Sperry Construction Has All Values of Honeycomb and Tubular Types.

Broad claims for the appearance and efficiency of Sperry radiators are made by the manufacturer, the Hooven Radiator Co., Chicago, Ill., the construction being such that they have all the quality values of both the honeycomb and tubular types.

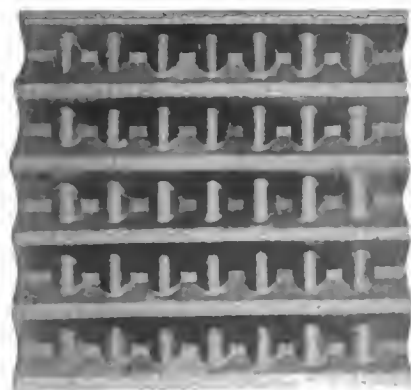


Front Vertical Section of Sperry Radiator, Showing Cellular and Tubular Construction.

In design the cooling sections are really a combination of the honeycomb, with large cells and consequent cooling efficiency, and the tubular, that is practically immune from clogging, because of the vertical water chambers. In addition to this the cores have the strength resultant from trussed or bridge design, being extremely rigid, and yet very light. A further claim is that the radiators are unusually efficient from the exceptionally large water chambers.

These radiators are now being produced commercially and are intended for all services—for trucks, tractors, aeroplanes and passenger cars. The design is a new idea in which claim is made that all the qualities of both types are combined with none of the faults of either. The Sperry radiator manufacturer maintains that the design is a distinct advance—the first that has been made in cooling systems, although all other details of engine construction have been materially improved during the past 15 years. This does not apply to processes of manufacture of accuracy of workmanship, but to affording higher efficiency, just as ignition air carburetion have been improved and have been made more dependable and reliable.

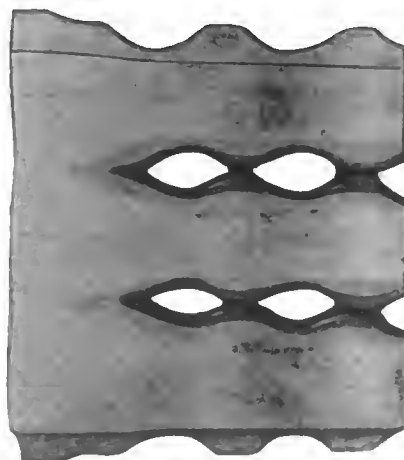
The Sperry radiator is unique in design. With reference to its construction the inventor, Mr. Hooven, states that



Section of Sperry Radiator, Side View, Showing Tubes Integral with the Side Walls of Cells.

when seen from in front the cooling section has the appearance of a honeycomb, which is regarded by owners and drivers of trucks and cars as being the most sightly construction. When the cross section is noted the ample zigzag canals impress one as affording an unusual degree of radiation and consequent cooling efficiency. But when the top of the core is observed one sees numerous vertical tubes through which there is direct gravity fall of the water content, and from a side view of the core one sees that these are pressed into the zigzag water walls and are actually a part of the walls.

Mr. Hooven claims that the tubular type radiator has an advantage as compared with a honeycomb type in that it will not clog with sediment or scale, that because of its vertical tubes the Sperry radiator cannot be obstructed so as to affect the circulation of water through it. At the other hand the tubular radiator has less radiating surface and will freeze quicker, and Mr. Hooven maintains that the Sperry radiator has a marked advantage in that the body of water carried is in the large zigzag canals and vertical tubes and there is



Top View of Section of Sperry Radiator, Showing the Openings of the Vertical Tubes Formed in the Walls of the Honeycomb Cells.

little probability of freezing. The tubular type, because of greater rigidity and that it may be repaired easily has been preferred for trucks and tractors, and it has greater endurance to road shocks and vibratory stresses. The Sperry construction is such that the vertical tubes are integral with the walls of the zigzag water walls and are substantially braced or trussed. The design especially adapts the Sperry radiator for either truck or tractor equipment. The resistance to freezing is a very potent factor in selecting radiators for aeroplane use, where they are subjected to low temperatures at high altitudes.

The surfaces where the walls and spacers are joined are unusually wide, this making for ease of soldering and insuring against breakage and leaks. Because of the extremely simple construction Sperry radiators are very easily and quickly repaired—minimum expense in the event of accident being an important factor with many owners. Sperry radiators are claimed to insure engine efficiency because of large water cham-

bers, the volume of water carried being from 35 to 40 per cent. more than either the tubular or honeycomb types. Mr. Hooven claims that the Sperry design is quite as important an advance in efficient engine cooling as was the designing of high speed types in engine construction.

MUST HAVE JERSEY LICENSES.

The New Jersey Commissioner of Motor Vehicles, William L. Dill, has begun a campaign to compel New York truck owners to license their machines in that state if used on its highways. At one session of a court at Newark 58 truck owners appeared to answer a charge of using their machines on Jersey roads without licenses. The trucks were used for transporting goods from New York City. The accused were released under suspended sentences with the understanding that their trucks should be licensed and equipped as required by the New Jersey law. The fact that they were used for interstate commerce appears to have had no weight before the court.

"EVR-LASTIN" DISTRIBUTORS.

The following concerns have been appointed distributors for "Evr-Lastin" Gear Compounds, manufactured by the Imperial Oil Co., 3124 Locust street, St. Louis, Mo.: Fred Campbell Auto Supply Co., St. Louis, Mo.; Wyeth Hardware Co., St. Joseph, Mo.; Lee Hardware Co., Salina, Kan.; Electric Appliance Co., Dallas, Tex.; Doty Oil and Supply Co., Oklahoma City, Okla.; George W. Bolton & Co., Detroit, Mich.; George W. Nock Co., Philadelphia, Pa., and Gildehaus Co., Centralia, Ill.

BROAD TIRES FOR TRUCKS?

State Commissioner of Motor Vehicles William L. Dill of New Jersey has made recommendation to the Legislature in his annual report that a legal requirement to use trucks on the roads of the state be "broad tires." He has also suggested that the license fee be 40 cents per horsepower of engine rating, this to be reduced each three-month period of the year.

RECEIVER FOR RUSH COMPANY.

Charles Este, Jr., has been appointed receiver for the Rush Motor Truck Co., Philadelphia, by Judge Thompson of the Federal court, with authority to sell the assets at 10 days' notice to all persons interested. Bankruptcy proceedings resulted from by an admission of insolvency in a resolution passed by the board of directors.

The capital of the Sanford Motor Truck Co., Syracuse, N. Y., has been increased \$100,000 and the plant is to be increased in floor area 50 per cent., the expansion being necessary to meet numerous orders.

OPERATING SYSTEM MEANS PROFIT

C. Bowen, New England's Largest Haulage Specialist, with Fleet of Pierce-Arrow Trucks, Makes Emergency Service a Choice Against Contract Work and Develops Business Rapidly

CONTRACT haulage as a business presents innumerable phases, all of which have material bearing upon success or failure. These can in some measure be applied to all concerns engaged in this work, but obviously will vary greatly with locality conditions, methods of operating, policies and the other influences. The term that defines the business may be used with reference to the operations of the man who does all his work with a single horse and wagon or to the concern that has a large fleet of trucks and whose revenue reaches a total expressed only by hundreds of thousands.

Contract haulage is a work in which thousands of individuals and concerns in this country are engaged. In a broad sense, it is specialized highway transportation, that is, doing cartage cheaper, quicker, or at least more economically or advantageously than it can be done by those who require such service. Specifically, it means undertaking work and making a satisfactory profit through character of equipment, methods or organization.

While the term contract haulage would seemingly imply service for a term or a period, this application is the exception rather than the rule. There are, of course, contractors that do the haulage of one or several concerns exclusively, while others will undertake any work that involves transportation in any form. Some specialize certain works, such as moving large objects and heavy weights, machinery, tanks, boilers, structural material and the like; others will do hauling long distances; there are those who will remove household effects sometimes hundreds of miles, and one might point to numerous instances where special

prices can be commanded for emergency service.

Exclusive Haulage Has Limitations.

Generally speaking, a concern doing haulage exclusively for one or several customers has definite tonnage to handle and can use for this work a given equipment. If there is variance in freight any excess may be taken care of by working longer hours or carrying larger loads or by other temporary change of method or system that will afford the necessary facilities. As a rule this manner of operating is regarded as affording the most certain form of financial return,

because the work can be very closely approximated, the revenue and expense do not vary greatly in ratio, and the equipment can be the fewest number of units with which the haulage can be done.

While exclusive service may be safer from a financial point of view, that is, there is an assured revenue and a definite operating cost, there is also a limitation upon productiveness, because other work that might be available cannot be undertaken, at least during the normal working hours of the day, no matter what the possible earnings. Growth is dependent upon the

number of contracts that can be made, which generally are for periods of time, and renewal of these is based upon the prices established by competition.

General Work Has Many Demands.

Concerns that accept work of any kind must have much larger equipment and entirely different organizations, for the orders will of necessity vary, and as there will be substantial loss if the vehicles are idle, there must be intimate knowledge of the requirements of customers and exceedingly close touch with them maintained. The possibilities for loss through idle-



Moving a Safe Containing Jewelry and Gems Valued at \$300,000 Less Than a Block, from Washington Street, Near Franklin, to Bromfield Street; a Work for Which a Month's Preparation Was Required.

ness are considerable, and these are in ratio to the degree of productiveness if all the equipment is operative. In the one instance the business done is conservative, but it is certain and sound. At the other hand the operating may be planned to meet anticipated demands, but if the work is not forthcoming the losses will quickly run into substantial figures, for vehicles and their crews must be ready for service, and these represent material investment as well as considerable expense. One idle truck a day, to illustrate, will probably offset the profit of two or possibly three that are in service, so loss of earnings from any cause that does not necessitate other expenditure may cause a deficit.

Many instances may be cited where contracts have developed rapidly and equipment has correspondingly increased, but these are rare as compared with those where the growth has been slow, for few contractors care to make initial investment without insurance of

office was in Sudbury street, in the North End of the section of the city known as Boston proper, and close to this the teams and men awaited orders, coming into the city mornings from Somerville and returning at the end of the day.

Mr. Bowen directed his organization from his office, which was in the centre of a manufacturing and wholesale section. He made contracts with different concerns to haul freights on a tonnage basis, but in no instance was there sufficient volume to assign teams exclusively to any one work. His experience was that when a customers' haulage was such that it required several units constantly, the customer invariably bought vehicles, and doing the work himself, made the profit that would have been made by the contractor. If this result was not experienced the customer would demand price concession proportionate to the tonnage and to the prices that might be established by others doing similar work.

He found that the most remunerative work was that which he could specialize, that required special knowledge and equipment, and for which business men were willing to pay. One work, for instance, was moving heavy safes from and into the upper stories of buildings, which required expert workers, who could handle these quickly, with minimum obstruction of streets and without danger. Another was removal of heavy machinery, he doing the dismantling, the moving and the assembling, so that operating adjustment only was necessary after removal. Similar work was done with tanks, drums, stacks and other large and bulky constructions. Structural units, assembled by the builders



The "Stand" at Sudbury and Bowker Streets, Boston, Which Is the Day Centre of Operations of the C. Bowen Haulage Equipment—This Centre Has Been Used for 41 Years.

the continuity of service. By this is meant that seldom will men purchase trucks unless they know they can profitably operate them.

Was Established in Boston in 1877.

No transportation service in America is more interesting to those engaged in contract haulage than that operated by C. Bowen of Boston, which was established by Cornelius Bowen in 1877, and though now bearing the name of the founder is carried on by his sons, Cornelius and John. The business was begun with a single horse and an express wagon, and for a considerable time it was essentially what is known as "expressing." Then heavier haulage was engaged in and soon this was specialized. The business was not without competition, but Mr. Bowen created a reputation for doing his work well and as he was a good organizer, had efficient employees, and while reasonable in his prices, made satisfactory profits, he constantly extended his customers. The

and ready for erection, were also hauled.

One will understand that in such work as has been specified the time actually required for haulage was very small as compared with the total necessary for making ready and for installation or erection. Because of the danger of moving large and heavy objects removal from or into buildings was necessarily slow and provision to insure against accident was imperative. Frequently equipment was constructed for a work that might not again be useful. Special rigging was in many cases necessary. A very substantial investment was represented by this equipment, and because of its infrequent use and the high initial cost a charge for it could not be based on ordinary measures of value.

Many Conditions to Be Observed.

All of the haulage of heavy loads through the streets had to be made in accordance with city ordinances and other municipal regulations, especially

when bridges were crossed. The rights of the public so far as safety and obstruction of traffic were concerned must be observed carefully, because failure to do so might result in refusal of permits. As Boston is in considerable part divided by rivers and arms of the harbor that are crossed by bridges, and none of the bridges are constructed to endure extremely heavy loads, the limitations are material, though not prohibitive.

What has been stated is to emphasize that where heavy objects must be hauled through the streets of a city the preparation necessary often requires time and considerable expense, and unless done by experts there is not only the danger to the public and to prop-

erally in teams from two to five, the total number in service being from 35 to 40.

The first truck was bought in 1909 and the purpose was to use this for hauling loads up to perhaps five tons beyond the zone in which horses were used, and to experiment generally to determine the economy of machines as compared with teams and carts. The machine was worked in much the same manner as horse teams were operated, the loads being smaller than could be hauled with the three, four and five-horse teams with the highways in normal condition, though, of course, with it the operating radius was greatly increased.

The truck was reasonably satisfactory when judged as an experiment. In design and in quality of materials it was not the equal of machines built later on, and it was operated with practically the same methods that were applied to the animal equipment. No real measure of economy was obtained with it because the cost of maintenance was excessive as compared with trucks acquired later. It had greater speed than the horses, but it was not believed to be as dependable, because of failures from varying causes. No system of accounting was at that time adopted to determine accurately the



Three of the Five-Ton Pierce-Arrow Trucks of the C. Bowen Fleet Ready for Loading at Broad and Donne Streets, Boston. All Waiting Time Is Paid For.

erty, but there is also probability of damage to the property being transported. As this preparation is necessary it must be paid for, and while in some instances work can be undertaken for a fixed price, in others the charge must be made up after computation of the cost of labor, equipment and supervision.

Aside from the haulage that has been referred to, Mr. Bowen undertook more or less general work. The operations that were originally confined to Boston and its immediate suburbs were gradually extended so far as the heavy haulage was concerned. Mr. Bowen employed a crew of men known as "riggers" that did all of the dismantling and setting up, and this gang, while it worked to some extent with the teams and vehicles, obviously had little to do with the actual haulage.

Worked With Horses Only Until 1909.

Until nine years ago C. Bowen operated entirely with horses. All of the heavy haulage was done with teams, the number of animals depending upon the work. The operating radius was approximately 10 miles, which was practically the limit that horses could be worked regularly hauling loads one way. The animals were worked singly in some instances, but gen-



Waiting for Orders at the "Stand." When the Vehicles Are Few the C. Bowen Equipment Is Busy and Customers Have to Await Their Turn.

earnings and expense of operating. This machine was disposed of and another make truck of the same capacity purchased after 17 months' service, and after a further period of experimentation with this a third of the same make was acquired. Later one of these was sold and the fourth, still another make, was bought, and later on the third machine was sold and the fifth purchased.

The period of service for the five trucks extended over four years approximately, and while each may be said to have given better satisfaction than those previously used, what was believed to be the machine best suited for the uses intended had not been found. A great deal of practical experience had been gained,

however, and the need of accurate knowledge of truck operating cost had been established. To illustrate, in the event that a work was to be done and a price demanded for it in advance, the customer must be given a figure that would be approved, and unless this would afford a satisfactory profit the work had best be rejected. To name a charge that would be regarded as excessive would, perhaps turn an inquirer to other contractors, and as in no instance would a customer be willing to pay more than the lowest price named, no matter whether or not the contractor made a profit, close figuring was always desirable.

Necessity of Operating Cost Records.

To know exact cost and to base prices upon it was absolutely necessary. As the company made charge by the hour, the day, the week or the service, two essentials were imperative to establish service value. The one was the cost a day and the other the cost a mile. There was another factor as well, the time a

er cannot lose time or service and the customer must expect that a charge be made when he is specially served.

The reader will realize that where the service charge is based on operating cost, as is so necessary with contract haulage, considerable depends upon the maintenance and upkeep. As truck operating cost increases with the continued use of the machine, the charge for work made the first year should be sufficient to meet the expense, plus repairs and an overhaul, made at the end of the year; that this policy should apply with reference to each succeeding year, else the truck owner will not make a uniform ratio of profit. In other words, the prices will be too low to cover legitimate operating. The truck that can be maintained in good operative condition at the least expense is the cheapest investment for the contractor, for in his work service life and endurance are two prime necessities.



One of the Special Works Handled by C. Bowen, This Being the Removal of a Large Tank and Setting It Up Ready for Service.

machine would be idle during a work. By this is meant a condition that often arises in contract work. If, for instance, a machine were ordered for a definite time, several hours after the usual hour for beginning work, so that it could not be utilized before it was needed, the charge must be sufficient to cover the entire time of the day until the work was completed. That is, if a machine is ordered for 9 o'clock in the morning it could not be worked prior to that time, and the charge would be from 7 o'clock until the work was completed. While the bill might not state the charge for the two hours no work was done with the truck the price an hour's time would be sufficient to cover the period of idleness. This differs diametrically with the policy of charging for the exact time of use a definite hourly charge, but it is abundantly justified when one understands that the truck could be used for another work that would be paid for were it not held to meet the order. Obviously the truck own-

er cannot lose time or service and the customer must expect that a charge be made when he is specially served.

The first unit of the fleet of Pierce-Arrow trucks now operated by C. Bowen was bought in March, 1913, and the other trucks were sold. Shortly after the second truck was delivered. Both were equipped with platform bodies with rack sides. The experience with trucks dictated the necessity of accurate records. As a basis the Pierce-Arrow estimate of operating cost was taken. The normal day's work was fixed at 50 miles. There was keen realization of the value of supervision to insure against loss of time of the machines and a good deal of attention was given to organizing and systematizing the operation of the business. Incidentally, what applied to trucks was applied to animal vehicles, and with a large measure of results.

The stable is at Somerville. This was connected with the office by a private telephone line. The number of outside telephones was increased. The equipment was operated from the office during the days, but the foremen each evening received the assignments of the drivers for the following day, which were distributed to the men before they left for home, so that there would be no morning delays, and the trucks and carts could be at work on time. If the work was for a full day no further orders were necessary, but if finished in less time the men made report to the office by telephone or in person and received additional instruction. The men not assigned for work reported to the foremen and went to the stand in Sudbury street to await orders from the office. From 7 in the morning until 6 at night the Bowen "stand" in Sudbury street is the centre of operations. The vehicles at the "stand" are the emergency division, in readiness to do



Just a Miscellaneous Load, but Wanted in a Hurry. This Is a Service That Has Made C. Bowen a Large Factor in Boston Transportation.

any work upon order. There are times when there will be neither trucks nor carts idle, and occasionally several will be waiting. The excess of equipment over demand is always indicated by the number of vehicles at the "stand." There are times when the most pressing orders can only be filled by overtime work.

Business Largest in New England.

The business of C. Bowen is today probably the largest of any contractor in New England. Last year the earnings considerably exceeded a quarter of a million dollars and it is expected to materially increase the present year. The fleet of machines has increased until it consists of eight five-ton and one two-ton Pierce-Arrow trucks, and besides these five 3000-pound, one 2000-pound and two 1000-pound trucks, a total of 17 power vehicles. The horse equipment, which ranged from 35 to 40 animals when the first trucks was purchased, has increased to 80. From this one will learn that in nine years the business has quadrupled, the greater part of the growth during the last five years.

While the animal haulage has increased so that the equipment is approximately 100 per cent. larger, the capacity of the trucks, most of which have been purchased in three years, has at least equalled the horse vehicles, and there is expectation that this division of the business will expand very rapidly. Only within the radius stated, where time is not a material factor, are horses used. Occasionally they are worked in large teams for hauling heavy objects that cannot be hauled on the trucks. For all work where speed is essential and low price is not the determining factor the trucks are utilized.

The Pierce-Arrow trucks are all equipped with platform bodies with rack sides and four of them have power winches that can be used for loading or unloading, or for hoisting or lowering heavy weights.

These are especially useful for moving large objects from or into buildings, such as safes, bulky furniture and the like. The machines were so equipped that there will be no delay in doing several works of practically the same nature, or in the event that a truck may not be serviceable. Considerable labor can be saved loading and unloading where the freights are such they can be drawn on or lowered from the decks of the trucks on skids; or where conditions are such that hoisting or lowering is necessary in placing the loads.

Some Examples of Special Work.

The work that is undertaken with trucks is generally distance hauling—that is, beyond the radius that horses could be used economically. Heavy freights have been taken as far north as Concord, N. H., and Portland, Me., and to New Haven and Ansonia, Conn., the latter point being north of Bridgeport, a distance of approximately 190 miles. One trip to Ansonia and return to Boston was made in 44 hours, a five-ton truck carrying a full load and a crew of two men, one man driving while the other slept. This was probably as fast work as was ever made for the distance with a machine of this capacity. Considering elapsed time only the truck averaged 8.63 miles an hour, but with allowance for stops for meals and replenishments and for unloading and loading, the average of the actual time was not far from 10 miles an hour. This was an emergency work for which a price was made before the start.

Another illustration of the fast service sometimes demanded by customers is that one night a light truck made the round trip to Providence, a distance of more than 80 miles, in 6½ hours. This was an average of approximately 15 miles an hour without allowance for stops. For such service as this customers are willing



Loading One of a Fleet of C. Bowen Trucks for a Removal of Office Furniture, to South Norwalk, Conn., That Required Quick Service.

to pay special prices. The equipment and the men that can be relied upon to do work of this class are always available, for C. Bowen is a transportation specialist.

Hauling 85-Foot Pole on a Truck.

One unusual work was hauling a derrick pole 85 feet long to Worcester. The pole was such length that it could not be carried by railroad save by utilizing three flat cars, and there was no assurance of the time when it could be delivered. The pole was badly needed for a construction work. What resembled two carpenter's horses were built and one placed at either end of the body platform of a five-ton truck. On these the pole was balanced, the forward overhang just clearing the cab. The horses and the pole were securely chained. With the ends of the pole projecting more than 30 feet ahead and behind the truck was driven over the road without obstructing or interfering with traffic. Because of the length and the high centre of gravity of the load the driver of necessity exercised great care.

An exceptionally interesting work was hauling a



One of the C. Bowen Pierce-Arrow Trucks at the Observatory at the Top of Blue Hill, Milton, Mass., the Highest Point Along the Atlantic Coast.

fountain weighing 9000 pounds to the summit of Blue Hill, in the Metropolitan Park Reservation, at Milton, Mass., to be located near the tower of the Weather Bureau Observatory. The ascent was made on a foot path so steep that when the engine of the five-ton truck could not be supplied fuel by gravity the machine was turned and backed up the hill. The expectation was that the load could be brought to within 2000 feet of the summit, but the truck was driven within 600 feet. Then by using plank ways and rolls and a block tackle made fast to the truck, which was driven down and backed up the hill a number of times, the fountain was placed where it was later erected.

How the Fleet Is Maintained.

The Bowen trucks are not kept in one place. Six of the Pierce-Arrow trucks are stored in a large garage at Cambridge, three others and three of the lightest machines are kept at the stables at Somerville, and the other five are garaged at a service station in the Fenway section. The intention is eventually to keep them in one station, but for convenience in handling

they are now scattered. At the Cambridge garage the Pierce-Arrow and the three lightest trucks are constantly inspected and adjustments and small repairs are made by a foreman mechanic and two helpers, who keep them operative and do whatever work is necessary nights, Sundays and such other times as they are idle. The other trucks are cared for by contract at the service station of the builder. All major repairs and overhauls of the Pierce-Arrow trucks are made at the service station of the J. W. Maguire Co., the dealer in these machines for Eastern Massachusetts and New Hampshire.

A great deal of care is taken to keep the trucks in good mechanical condition so that there shall be no lost time unless when an overhaul is made. The attention given affords satisfactory results, for very rarely are not all in use. The experience is that this degree of care is the best economy. The system of operation has been outlined, the work being directed from the office, which has five trunk line telephones and a private line connecting with the stable. There are three foremen, who direct the drivers of the trucks and the teams.

Careful Supervision Saves Time.

Where heavy removal work is ordered considerable time may be required for preparation. The actual haulage may be done in an hour or two, but not infrequently days and sometimes weeks are needed for making ready. The weather and traffic conditions and operating necessities must be considered as well. In many instances loading and unloading must be done very carefully or slowly. There are innumerable causes for loss of time, and only by extremely careful supervision and intimate knowledge of any special work can a profit be made. This care must be given to all work done with the trucks and the service time of each machine is closely analyzed. The operating cost is given the same attention, and from the level or standard, which necessarily varies slightly with the changes in variable items of expense, the prices for work are established. The charge for a five-ton truck for a 10-hour day is \$35, but if the machine is charged for on the hour basis the unit is \$3.80.

The Messrs. Bowen are believers in trucks for all work outside of the zone in which horses are operated, and that freightage of all kinds can be hauled long distances much quicker and more economically by highways. This applies, of course, to continuous service. Special work will necessarily command prices in ratio to the need. The purpose is to use trucks as much as is possible and wherever practical to use them to the exclusion of animal vehicles. But the determining factor will always be economy, or, to put it another way, the lowest cost for a given work. Incidentally there is reason to believe that with the beginning of spring the truck equipment will be increased. The policy will be to standardize on small machines just as the large units are now standardized with Pierce-Arrow trucks.

WAR CONDITIONS FORCE ELECTRIC TRUCK SERVICE

Foreign Shortage of Fuel for Gasoline Engines Causes Recognition of Their Economies.

In a review of the "Electric Vehicle Situation," A. Jackson Marshall, secretary Electrical Vehicle Section of the National Electric Light Association, states that considerable impetus to the use of electric vehicles has been lent by the war and that the gains are permanent and foreshadow a bright outlook.

"At the outbreak of the war," he says, "England had in use about 150 electric freight vehicles which were installed during a period of 10 years, representing an average yearly installation of about 15 machines. As gasoline became scarcer and more expensive, increased consideration was given to the electric vehicles, for England possessed right in her own land well nigh inexhaustible supplies of coal through the medium of which electric current could be generated at comparatively low cost in practically unlimited quantities.

"The electricity supply companies throughout England made investigations, resulting in numerous electric vehicle charging facilities being made conveniently available, and they furthermore offered this charging current in many instances for what in our money would be about two cents per electrical unit.

"It might, however, be interesting to note that whereas England had but 150 electric trucks a little over three years ago, today about 1000 are in operation and many more are on order, and were it not for the lack of transportation facilities these figures would be considerably greater. The yearly rate of electric truck installation three years ago was about 15, whereas the average yearly rate the past three years has been about 300, with the present yearly rate about 500.

"England has also found a greatly increased use of electric passenger cars, which in many instances are employed in important work far removed from what we ordinarily might consider as pleasure. When it is realized that the electric passenger vehicle more than successfully competes with the gasoline car in urban territory, with gasoline at from 12 to 15 cents a gallon, and electricity at about five cents per kilowatt hour, the immediate importance and value of the electric passenger car is considerably enhanced, for gasoline (when procurable) now costs in England about \$1 a gallon and electricity about two cents per electrical unit.

"In Norway and Sweden electricity is plentiful and cheap, largely on account of great water power developments. On the other hand gasoline is almost impossible to obtain at any price, but when procurable costs upwards of \$1 a gallon.

In these countries vast electric vehicle developments are pending and already large installations have been made which are operating in a most satisfactory manner. Were it possible to freely obtain export permits and shipping facilities to these countries, great numbers of electric vehicles of all types would be rapidly purchased and installed. Ultimately electric vehicles will be made available in Sweden and Norway in almost unlimited number either by importation or local manufacture and then "electrics" will rapidly become the national mode of mobile transportation.

"In Italy the electric vehicle has somewhat more recently been recognized and plans are now being perfected whereby the electric power generated by Italy's water falls will be utilized extensively in supplying the propelling force for large numbers of electric vehicles. One of the electric vehicle promotion schemes now maturing is a large and representative touring exposition of electric vehicles, which will be displayed and described in such a way as to educate the people to the advantages of this form of locomotion, especially as by such means Italy is able to capitalize on her water power development which, to the extent of the development of the electric vehicle industry, will make her independent of the importation of gasoline for the operation of such type of vehicle.

"In Australia and New Zealand, in South Africa, Japan, Mexico, South America, Denmark, France, and, in fact, all over the world, electric vehicles are now being exported in increasing numbers.

"The electric vehicle had made great headway in Germany prior to the outbreak of the war and during the last three years the electric vehicle of all types has played an important part in Germany's existence. Electric taxicabs in Berlin before the war gave the highest class of service available, and these electric taxicabs were considered by the municipal authorities as worthy of special consideration, which was extended.

"In the United States (in Detroit) the highest class of taxicab service is afforded by electric taxicabs, likewise in Chicago and St. Louis. We do not know very much about what is transpiring in Germany now, but fragmentary reports all indicate that the electric vehicle, even in the face of all the general destruction which prevails, is taking an even more commanding position in the transportation field, where it is employed on the streets of the cities, in the coal mines, in the form of electric railways and for trackless trolleys, which are likewise proving a success in England.

"Foreign countries have had a very satisfactory experience with electric vehicles, especially these last three years. The countries will even more extensively use electric vehicles after the war, and with the return of more normal times, especially during the reconstruction period of many years duration which will follow. The thousands and thousands of electric vehicles required will to a very large measure be supplied by American manufacturers."

COOPERATIVE TRACTOR WORK.

One of the speakers at the dinner of the Society of Automotive Engineers, held at the Hotel Baltimore, Kansas City, was Dean W. M. Jardine of the Kansas State Agricultural College at Manhattan, Kan., who stated the need in that state for the present year so far as power farming was concerned to be cooperative work with tractors. By this he meant the farmers, though not willing to accept the proposition to own tractors and work them in a cooperative way, would undoubtedly obtain the best results were such service available. He advised that tractor manufacturers send as many machines as they could into the state to do spring plowing, and stated that the State Council for National Defense would arrange for plowing where good rates for the work could be obtained. He urged that the dealers in tractors rent their demonstrating machines for contract work. The state will be short 70,000 laborers this year and the desire is to plant 24,000,000 acres, and the work can only be accomplished with tractors. There are about 6000 tractors now owned in the state, and of this number 2000 were bought last year. The state will have to harvest from 25,000,000 acres during the summer and autumn, as well as plowing for the next crop of winter wheat.

STATE TO TRAIN TRACTOR MEN.

At the Michigan State Agricultural College at Lansing, from March 4 to 16, a school for training men to drive farm tractors will be conducted by the college faculty, directed by Prof. H. C. Musselman. The college has 12 gas and steam tractors available and the special students will be enrolled in the department of farm mechanics.

W. W. Fleckling, well known in the motor industry through his connection with the Olds, Cadillac, Garford and Gramm-Bernstein companies, has joined the forces of the Fulton Motor Truck Co., Farmingdale, L. I.

The Hinkley Motors Corporation, Detroit, is now producing engines for trucks for United States army service and building from 40 to 50 a day. This number will be considerably increased shortly.

C. B. Chamberlin, formerly with the Gramm-Bernstein Motor Truck Co., Lima, O., has been appointed general purchasing agent for the United States Motor Truck Co. of Cincinnati, O.

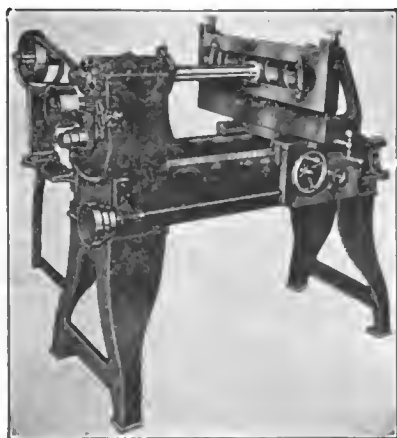
Garage and Service Station Machinery, Tools and Equipment

CYLINDER GRINDING MACHINE.

A cylinder regrinding machine designed for grinding gasoline engine cylinders from the smallest motorcycle type to a six-cylinder block $31\frac{1}{2}$ inches long is being manufactured for use in repair shops and garages, where there is a call for repair work of this sort.

The bed and legs are of the conventional type and designed to eliminate all possible vibration. The boring spindle, which is designed for strength and rigidity, is $4\frac{1}{4}$ inches in diameter by $10\frac{1}{2}$ inches long and carried upon heavy bearings.

The face plate upon which the cylinder block is mounted while being ground is large and heavy, and has both a cross and lengthwise feed, the latter being automatic. It is also fitted with two



Cylinder Grinding Machine.

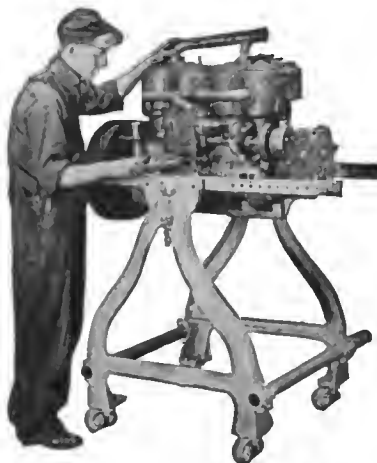
knurled nuts by which the plate may be raised and lowered, thus facilitating the centering of the cylinder.

The length of the bed is 55 inches and the width $15\frac{1}{4}$ inches. The height from the bed to the centre of the spindle is 12 inches. The whole machine occupies a floor space of approximately three by five feet.

Manufactured by the B. L. Schmidt Co., Davenport, Ia.

CONTINENTAL MOTOR STAND.

Efficiency is the watchword of the present day and every successful business must be run on the most efficient basis. The repairing of an automobile engine is an important job and only by doing the work well and quickly can the repair man hold his place in the big competitive race for success. The Continental motor stand is a device which makes for efficiency in that when the engine is mounted upon it it may be turned to the most convenient position for repair. This device is designed to be adjustable to practically any size auto-



Continental Motor Stand.

mobile or truck engine. It is made of the best of materials and fitted with wheels so that it may be moved easily to any part of the repair shop. With the stand comes all of the necessary bolts and clamps to secure the engine into place.

Manufactured by Continental Auto Parts Co., Knightstown, Ind.

RHODES HORIZONTAL SHAPER.

Next to the milling machine there is no machine tool that can be used for such a variety of small work as the shaper. With this tool many small jobs, such as planing, grooving, cutting keyways, etc., can be accomplished very quickly. The Rhodes shaper illustrated is designed for small work and fitted with a sliding bed, upon which is mounted a revolving vise table. The cutting tool has a seven-inch stroke.

A particularly pleasing feature of this machine is that it may be converted into a $3\frac{1}{2}$ -inch vertical slotter, adjustable to



Rhodes Horizontal Shaper.

10 degrees, simply by removal of the traveling table and attachment of the vertical shaper arrangement.

Manufactured by the Rhodes Manufacturing Co., Hartford, Conn.

STEVEN'S SERVICE CABINETS.

Nothing leaves such a lasting and favorable impression upon the accessory buyer as quick service, in fact, service may well be said to be the key to success. To facilitate service, accessories and parts must be conveniently located and kept in order. Many sales are lost because the dealer has forgotten where the part in question was located. To systematize the parts stock the Stevens service cabinets have been designed. Practically any combination of units may



Stevens Service Cabinets.

be assembled so that the dealer has a place for every part.

The cabinets illustrated show two possible and useful combinations of Stevens' units. The combination in the front is made up of three units and a top. The top units contain 172 small and medium sized drawers, which will hold small stock parts and bolts. The lower is fitted with 20 large sized drawers, which are suitable for larger and heavier parts, accessories or tools.

The combination in the rear is made up of three units, the two upper being the same as those in front. The lower section is fitted with doors and a shelf upon which may be stacked larger and heavier parts, such as cylinders, crankshafts or transmission parts.

All of the draws are covered with heavy galvanized steel and may be fitted with compartments, and cross divisions as desired.

Manufactured by Stevens & Co., 375 Broadway, N. Y.

UNIVERSAL ANGLE PLATE.

The value of a machine tool in any shop is dependent upon the number of times it can be used and the variety of work that can be done upon it. The Universal Angle Plate is designed to be attached to any plain milling or grinding machine, converting it into a universal tool, upon which may be done many jobs that would have been impossible without the employment of the plate.

The table has an adjustment through 360 degrees horizontally and 90 degrees vertically, without disturbing work bolted to it. Graduations with Vernier attachment reading five minutes, permits of its use for especially fine work.

The tool is rigid and strongly built and has unlimited possibilities of application for work in connection with lathes, planers, milling machines, shapers, drill presses and grinders.

Manufactured by Boston Scale and Machine Co., 381-389 Congress St., Boston, Mass.

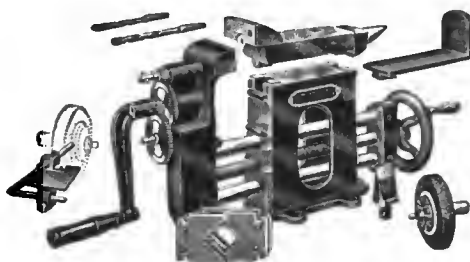
GRINDING AND BUFFING TOOL.

A machine tool of practical value to the garage and tire repair man is the Johnson Electric Grinding and Buffing Tool. The machine is operated by a self-contained motor, with all its working parts enclosed in a dirt proof casing. The motor may be had in a number of windings at speeds of either 1800 or 3600 revolutions per minute.

For garage work the arbors may be fitted with two grades of emery wheels; for tire vulcanizers, a buffer and grinding wheel. The manufacturers say that the machine is pleasing in appearance; smooth, easy running and silent in operation.

The illustration shows the machine mounted on standard, but the grinder unit may be purchased or used separately.

Manufactured by U. S. Electrical Mfg. Co., 459 E. Third St., Los Angeles, Cal.



THE STEWART HANDY WORKER.

A handy device which should be of great value in any repair shop or private garage is known as the Stewart Handy Worker. Complete, the device weighs 90 pounds and is, primarily, a vise. Such is the construction, however, that many tools are combined with it.

As a vise the jaws open to 4½ inches and being faced with steel are practically indestructible. The jaw opening mechanism is operated by a band wheel and screw, the sliding jaw being supported upon two heavy round pieces of cold rolled steel.

The sliding jaw is fitted with a three-gear reduction spindle, with provision for handle upon each gear. The upper spindle extends through the jaw and is fitted with device for holding square shank drills, thus forming a drill press. With the device is furnished an adjustable arbor upon which may be mounted an emery, buffing wheel, or scratch brush.

The rear jaw, which comprises also an anvil, is removable and fitted with metal cutting tool. With the jaw removed and an L fitting substituted, a drill press is formed.

An extra pair of toothed pipe jaws fit between the vise members, forming a substantial pipe holding device. Complete with all fittings the machine may be said to have an unlimited range of work, and as it is substantially constructed, will withstand considerable hard usage.

Manufactured by Chicago Flexible Shaft Co., 12th St. and Central Ave., Chicago, Ill.

PORTABLE FLOOR CRANE.

There are perhaps but few pieces of garage equipment of more utility than the floor crane. Its many uses and the saving of time accomplished by its employment make it almost invaluable where there is much automobile or machine work done. The crane illustrated is designed to combine strength with lightness. The superstructure is made of steel, the base of cast iron. Standard cranes are made in a number of sizes and have capacities ranging from one to two tons with lifts from 6½ feet to 7½ feet according to size. The length of overhang, which is so important in a crane for garage uses, is 30 inches in the one ton size, 34 inches in the 1½ ton and 36 inches in the two ton. The gear ratio of leverage on the hoist drum is very high and gears are wide faced and covered with a proper guard for safety. The single front steering wheel is fitted with a device by which the crane may be made immovable by locking with the foot.

Manufactured by the United Engine and Manufacturing Co., Hanover, Pa.

LIPMAN AIR SERVICE STATION.

This is a tire filling station complete for the curb or driveway of a garage or repair shop. It consists of a stand surmounted by an opalescent electric light globe enclosed. In the base is a Lipman four-cylinder, water cooled air compressor or connected through enclosed gearing with a one-quarter horsepower General Electric motor, which is furnished for any standard voltage the customer may require. It is automatic in action. When the door is opened the motor starts and when the door is closed the motor stops. Air is furnished through a 28-foot length of hose, which is fitted with patented pressure control valve and a gauge which indicates correct tire pressure. In addition to the light at the top there is a light in the base compartment which is turned on and off by the door action.

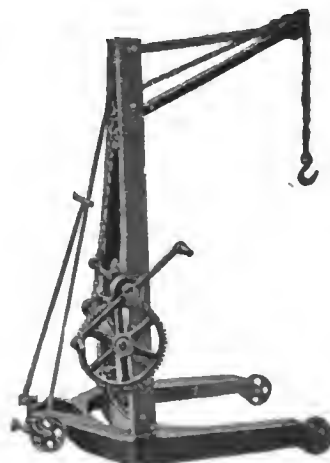
Manufactured by Lipman Air Appliance Co., Beloit, Wis.



Universal Angle Plate.



Grinding and Buffing Tool.



Portable Floor Crane.

REMADE BEARING SERVICE

Ahlberg Bearing Company Will Increase Its Organization.

The tendency of ball bearing manufacturers and makers of parts to establish close relations with users of bearings, which has been manifested very frequently during the past few months by formation of reliable service organizations, is emphasized by the progression of the Ahlberg Bearing Co., Chicago, and its branches throughout the country for the distribution of remade and new bearings.

Statement is made by the Ahlberg company that it originated the remade bearing idea, as well as the establishment of a chain of branches in the principal cities of the country for affording service to owners, as well as dealers, repairers and others who might have occasion to obtain bearings for any purpose. Now the company has 12 branches, located advantageously for affording service, at

parts, or obtain new in either his own town or a nearby city.

RESILIOMETER TESTS.

The Advance Felt Specialty Cutting Co., Chicago, Ill., with sales offices at Detroit and New York City, specializes parts of felt, leather, paper, cloth or asbestos cut to exact size, and produces felt washers, gaskets, strips and mechanical parts from felt of the color, thickness, weight, density, hardness or resiliency that is required. The company produces exactly what is specified and its methods makes practical standardization of any felt or resilient material through use of the Widney patent "resiliometer," which scientifically measures thickness, hardness and resiliency, taking samples of what precisely meets requirements and duplicating every quality. These analyses are made by engineers in the laboratories of the company and recommendations are made with reference to any material that is used or may be considered.



Main Plant of the Ahlberg Bearing Co., Chicago, Which Now Has 12 Branches for the Exchange of "Remade" and the Sale of New Bearings.

each of which is a stock of remade bearings which are exchanged with customers, who are charged the cost of remaking, or as the company terms the service, "reconstruction."

The plan insures a considerable saving to the customer, and repeated tests have proven that a remade bearing is just as serviceable as a new part. In addition to the remade bearings the company has at all branches stocks of new bearings, which are supplied to those who desire them at the prevailing market prices. The saving in steel is considerable, which is especially desirable when so much high grade metal is needed for war munitions.

As quickly as the details can be worked out the Ahlberg company will take over the service plants of all former Hess-Bright bearing distributors, and it will appoint new distributors for remade and Hess-Bright bearings in cities where it now has no representation. The object is to have such service that the owner of a power vehicle, or machinery for which bearings are required, can exchange old bearings for remade

makers were substantiated by facts. The trials were not limited, the engineers being authorized to do whatever they believed would fully test the substitute for air. The report as submitted showed that the compound was not affected by temperatures, by heat, that it did not expand or contract when subjected to heat or cold, that it was impervious to water, and that when submerged in boiling water or frozen in ice for days or when subjected to heavy pressure it resumed its form without its resiliency being impaired.

One conclusion was that riding in vehicles equipped with tires filled with Essenkay was quite as comfortable as when inflated with air, and that the shocks were quite as well absorbed. The engineers determined the authenticity of letters testifying to the use of Essenkay for periods up to five years, and that the filling had been changed from one shoe to another as the casings became worn. With the use of the compound punctures, blowouts, rim cuts and other forms of tire damage were obviated, and there was no cause for inflating or deflating them. The report as a whole was a very enthusiastic certificate of quality, and the manufacturer of Essenkay maintains that it was proven to be a success from every point of view so far as tire economy is concerned.

SKF TRACTOR BEARINGS SHOW.

At the show of farm tractors at Kansas City, Mo., Feb. 11-16, the SKF Ball Bearings Co., Hartford, Conn., made exhibition of SKF radial and thrust ball bearings as applied to tractor practice. Machines equipped with these bearings were shown in motion to direct the attention of visitors to the exclusive qualities of the bearings, and there were demonstrations with parts, showing the self-aligning feature of SKF design.

The exhibit was in charge of Robert C. Byler, assistant advertising manager of the company, who was accompanied by the following representatives: S. B. Taylor, vice president; C. R. Mibley, manager of the automotive department, and J. B. Castino, F. J. Rider, J. C. Long, C. C. Walsb and A. J. Gillespie, sales engineers.

PRISON FOR RECKLESS DRIVER.

Mathew Sullivan, aged 19, driver of a truck that struck and injured two children in a New York City street No. 14, has been sentenced to a year in prison after trial. Sullivan drove away after the accident, but was apprehended through the license number of the truck being noted by two persons who witnessed the accident.

PLAN LONG HAULS OF COAL.

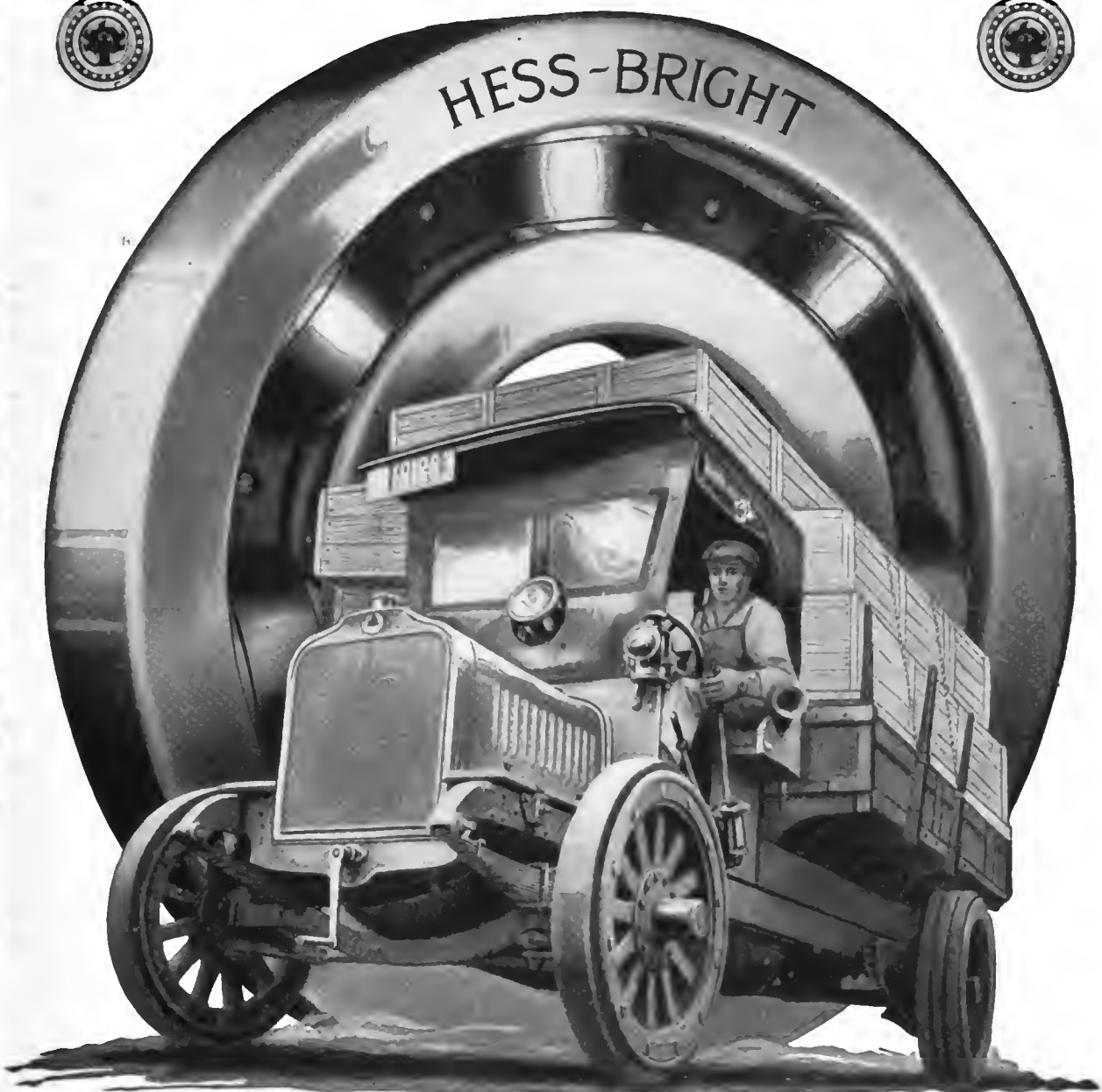
The Detroit Board of Commerce has planned to haul coal by truck from Toledo, O., to Detroit, a distance of 60 miles, and perhaps directly from mines, to insure against a coal shortage in that city the coming year.

ESSENKAY TIRE ECONOMIES.

The loss of service because of the failure of pneumatic tire, principally from puncture, is one of the largest items of expense for owners who operate freightage machines equipped with tires of the stated type, and because of the uncertainty of shoes, which are especially vulnerable to objects that are sharp or pointed, there is much practical utility in filing that will serve all the purposes of compressed air and yet will insure continued service in the event of a cut or puncture.

Such a compound is known as Essenkay, a product recently investigated by the National Ford Owners' Club, and the tests, which were made by competent engineers, were with the object of determining if the strong claims made by the

HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED



How long will it last?

UNLIKE a motor car, soon exchanged for a new model, a motor truck is retained in active service until it wears out. If it depreciates rapidly, it is a bad investment.

Today, when the need for motor trucks is so pressing, it is essential that they be designed for reliable and extended service.

Inspect the important parts of a truck, the bearings especially.

If it has Hess-Bright Ball Bearings, you can be sure it is built for real work, for they indicate conscientious construction and insure long, economical service under any conditions.

The HESS-BRIGHT Manufacturing Company

HESS-BRIGHT BALL BEARINGS

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

Labor and Money Saving Suggestions for the Truck Repairman.

TOOL BOARDS.

(Figure 1.)

"A place for everything and everything in its place" is a good motto for the automobilist. Many a motorist boasts of a stock of tools which he has picked up from time to time from the road where another less fortunate one has left a portion of his tool kit.

Our illustration shows the general method of constructing a tool board. The board should be about 12 inches square. The tools should be arranged upon it in any convenient order and held in place by strips of leather. These strips are threaded through holes in the board, and are drawn up tight from the ends. One board may contain tire tools, another engine tools, wrenches, etc., and another special tools. It is an easy matter to keep the tools in their respective holders and the absence of a tool is quickly noted. The board makes a very handy portable tool chest, and may be removed from the machine at any time to prevent theft.

DRILLING ATTACHMENTS.

(Figure 2.)

The amateur mechanic quite frequently finds that he is unable to drill holes in metal without a great deal of effort, and when the holes are so drilled they may be at most any angle with the surface, to which they should be at right angles.

The material for making the apparatus suggested herewith consists of a carpenter's bit brace, an iron collar, a piece of $\frac{1}{4}$ inch round iron rod, a length of board and a piece of rope. The collar should be large enough to fit over the end of the bit brace and should be provided with a set screw to hold it in place. Near the outside of the collar bore a hole large enough to receive the $\frac{1}{4}$ inch round iron rod. Provide this hole with a set screw as shown at "A." Remove the chuck from the brace and slip the collar into place. The $\frac{1}{4}$ inch round iron is put into place and the brace assembled as shown at "B." The length of board is hinged to the side of the wall over the work bench. About two feet from the wall a small concave hole should be gouged out of the board to fit the top of the brace.

To use the apparatus place the piece of iron in which the hole is to be made beneath the hole in the board; the bit with drill is placed above it as shown in our illustration. The $\frac{1}{4}$ inch round iron is first used to "centre up" the work, which is so placed as to allow the end of the $\frac{1}{4}$ inch round iron rod to touch the surface all around the circle described by it. The iron rod is then drawn back and forms a depth gauge. A weight, such as a pail of water, is suspended from the end of the board. Our illustration clearly shows the apparatus when

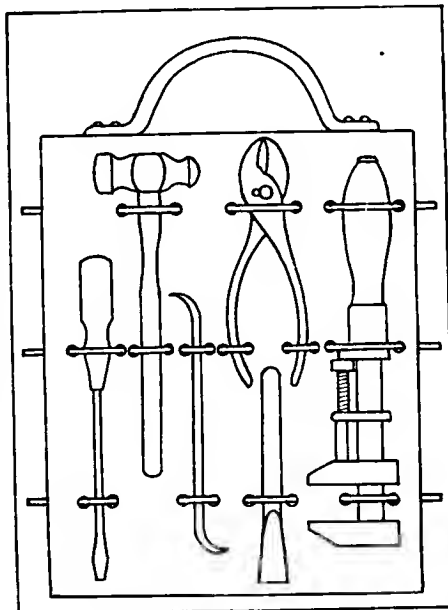


Fig. 1—Handy Tool Board.

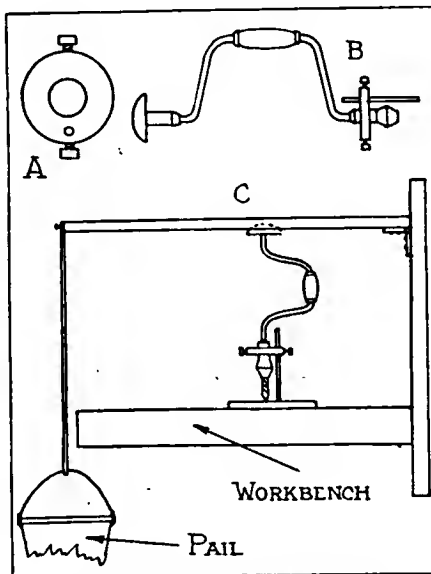


Fig. 2—Drilling Attachments.

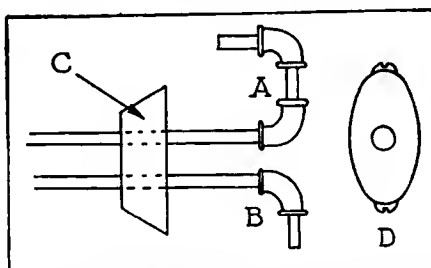


Fig. 3—A, Garage Oil Pump; D, Brake Repair.

assembled. this the hole may be drilled to a predetermined depth and it will always be at right angles to the surface.

GARAGE OIL PUMP.

(Figure 3 A.)

The oil pumps used in garages for transferring oil or gasoline from barrels frequently are lots of bother because of leaking joints and improper packing. Our illustration shows a handy arrangement for this purpose, it having no packings to cause trouble. The whole apparatus is composed of pipe fittings and a wooden or cork stopper. The sketch clearly shows the construction, in which $\frac{1}{4}$ -inch gas tubing is used. The apparatus works as follows: The stopper "C" is driven into the barrel and air is forced in through the pipe "B" by an air pump or from a compressed air tank. The air pressure in the barrel displaces the oil or liquid, which is thereby forced up through the pipe A into the container. The height to which the liquid may be forced is dependent only upon the air pressure through "B."

BRAKE CAM REPAIR.

(Figure 3 D.)

It frequently happens that the brake cam or brake lining becomes so badly worn as to prevent the setting of the brake when the cam is at its extreme position. A simple remedy for this fault is shown in our cut. It is accomplished by boring and tapping a hole in the brake cam at its largest diameter and screwing in two machine screws. The heads of the screws make possible a wider expansion of the brake band.

CARBURETOR TROUBLES.

If you are troubled by backfiring through the carburetor, which may be due to late ignition of a weak mixture, try the following suggestion: Place a flared cone of very fine wire gauze of 60 or 60 mesh in the suction pipe between the ends of the pipe and carburetor with a soft gasket to prevent any leakage. This will not only stop backfiring, because flame even under pressure will not pass through a very fine screen, but will result in much better engine service.

RAIN PROOFING WINDSHIELD.

To avoid the necessity of lowering the windshield in rain storms, owing to the collection of water on the front of the glass, which obscures the vision, a solution of soap may be applied which will keep the glass transparent. A small quantity of semi-liquid or soft soap should be made into a thin paste with water and applied evenly over the inside and outside of the glass, leaving a thin film. While this is hardly noticeable to the eye, when the rain or moisture strikes the surface it will run off, leaving a clear vision.

SOLDERING TORCH.

(Figure 4.)

For a number of years the writer has had an inverted acetylene light burner, such as is used on headlights, over his work bench. This is connected to the city gas supply and makes an excellent flame for soldering small work without bothering to heat a soldering iron. It also makes a very handy pipe or cigar lighter for the tool room.

COMPRESSING SPRINGS.

(Figure 5.)

One of the most exasperating things that the amateur automobile repairer has to deal with is the matter of compressing springs. For instance, the valve springs in an ordinary L head motor are usually hard to get at and require compressing before the valve pin can be put into place.

The following method will be found very practical for attaching wires to keep the spring compressed: Select two iron washers large enough to equal the outside diameter of the spring to be compressed and cut slots about $\frac{1}{4}$ inch wide, as shown at B. Place these washers on each end of the spring, having the slots pointing upward, and then place in a vise and screw up until the spring is fully compressed.

Now bend two wires in the form shown at A. These should be heavy enough to hold the spring tightly, and the bent over ends should be just long enough to hook over the coil of the spring. The ends of the wires should be bent toward each other so that the tension of the spring does not slip them off. The sketch shows about the proper proportions and angles.

One of these hooks may now be inserted over the compressed spring through the washers. Turn the spring around, screw up on the vise and hook on the other wire. The spring will be held fully compressed by the two wires, as shown at D, which may be easily slipped off when the spring is in place, if the hooks have been properly bent.

Save the washers and hooks for the next time.

DIRECTION OF CURRENT.

(Figure 6 A.)

Much harm may be done the storage battery in charging if the current is improperly connected; that is, if the negative supply wire be connected with the positive battery terminal. The apparatus shown in the diagram should be kept handy and used at all times to determine the proper leads from the supply.

Fill a bottle about three-quarters full of electrolyte solution such as is used in storage batteries. For this purpose, however, a solution of salt and water will answer.

Two stiff copper wires should be run through the cork and reach about two inches beneath the liquid. The ends of the wires should be about $\frac{1}{4}$ inch apart. Upon connecting these terminals with the source of supply it will be noted that a great number of bubbles arise from one

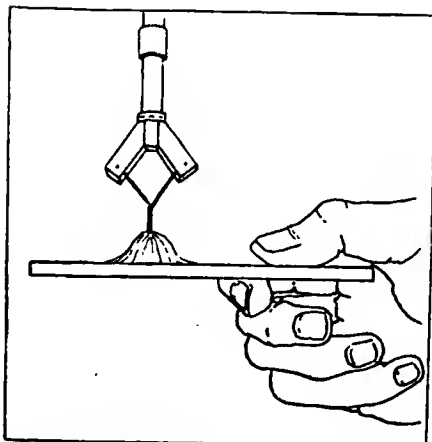


Fig. 4—Illustrating a Handy Soldering Torch.

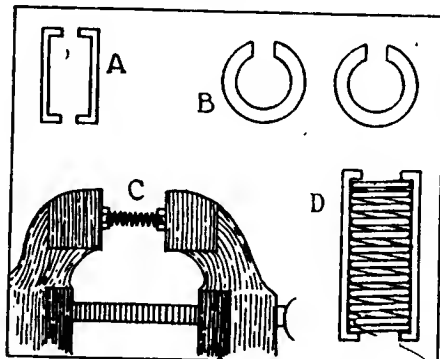


Fig. 5—Practical Suggestion for Compressing Valve Springs.

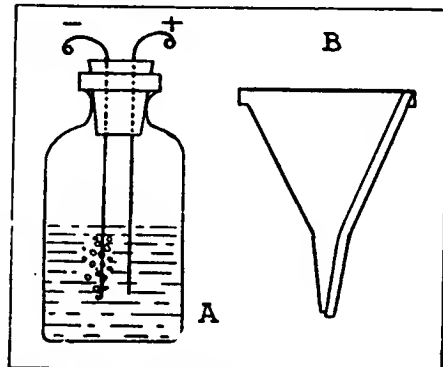


Fig. 6—A, Bottle Detector for Finding Direction of Current; B, Useful Filling Funnel.

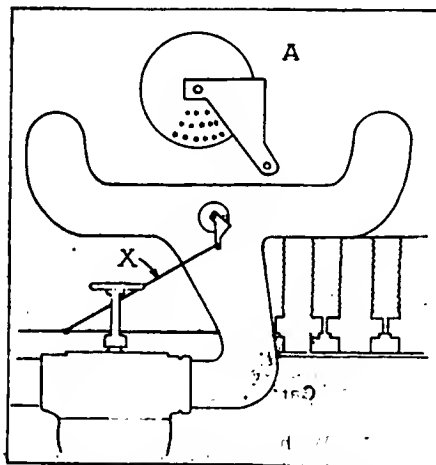


Fig. 7—Auxiliary Air Intake.

terminal (the negative), while the other or positive terminal is comparatively free from bubbles.

USEFUL FILLING FUNNEL.

(Figure 6 B.)

Unless care is used in filling a gasoline tank by means of a funnel the air pressure will blow the gasoline back. The sketch shows an easy method to overcome this by soldering a small vent tube on the inside of the funnel. If the tube were soldered on the outside it would soon become bent up and its usefulness impaired.

AUXILIARY AIR INTAKE.

(Figure 7.)

In a great many cases much fuel may be saved if an extra air supply is provided for the engine when running on the higher speeds. You can make from a grease cup, a piece of sheet brass and a length of heavy wire an auxiliary air intake that will prove as efficient as many on the market. The cap of the grease cup should be perforated to make a number of holes in a triangular pattern, the piece of brass cut into shape and riveted to the centre of the cap and left free to swing on its centre so that by its movement the holes may be covered or uncovered. (See A.) The assembly is then screwed into the intake manifold, as shown at B, and a wire run from the piece of sheet metal to the throttle wire. As the throttle is opened and the engine speeded up the holes in the cup are opened by the throttle action and more air is admitted. When the throttle is closed, or nearly so, the air is prevented from entering. The correct setting and length of the wire, X, can be determined by experiment.

RADIATOR CURTAIN.

During cold weather it quite frequently happens that the cooling system absorbs too much heat and the proper running of the engine is greatly impaired, in which case it is customary to cover up a part of the radiator to prevent the excess air circulation. A piece of cardboard is a rather unsightly make shift. On most makes of cars the following suggestion will prove practical: Underneath the radiator mount a curtain roller with a dark green or black curtain on it. The curtain may be pulled out over the radiator when necessary and tied to the filler cap securely. When not used the curtain is rolled upon the roller and is entirely out of sight.

MAGNETIZED TOOLS.

Rub one of the poles of a strong horse-shoe magnet over the end of a long screw driver to magnetize it. You will be surprised at the things you can do with a magnetized tool. Pins may be put in place, screws entered in inaccessible positions or pieces of iron and steel picked out of a gear case or engine.

WINTER TRUCK RECORD "OVER TOP" TO YOSEMITE.

Loaded Fageol 2½-Tonner Driven 440 Miles Through Sierras in 46 Hours.

A drive from Oakland, Cal., to the Yosemite Valley, and return, a distance of 440 miles, that was made in 46 hours with one man driving continuously, was made by C. L. Butler of Butler-Veitch, Pacific coast distributors for Fageol trucks and tractors, which was in many ways remarkable. The start was made from Oakland at 8:50 in the evening and the first half of the trip was completed at 6:45 the following evening, the actual driving time being one hour and 15 minutes less.

The return was begun at 7:50, after a stop of an hour and five minutes, and Oakland was reached the second evening at 6:50, the stops totaling five hours and 25 minutes. The total running time was 38 hours and 15 minutes and the average speed was 12 miles an hour while driving. The best time from Wawona to Oakland, 220 miles, was 12 hours and 50 minutes, the average speed of the return being 18 miles an hour.

The drive was remarkable in that it was over seven different mountain divides, the highest of which was more than 8000 feet elevation. Much rain had fallen and for long stretches snow to considerable depth was plowed through, but the greatest obstacle was the mud, for some of the grades were as much as 30 per cent. and the truck was loaded to capacity.

While the time made climbing the grades was comparatively slow, because of the mud and the accompanying dangers of short turns and steep declivities, on the level roads the truck was driven mile after mile at 30 miles, this being possible through a patented compound reduction gear exclusively used in these machines. The gasoline consumption was 64 gallons and the average was seven miles to the gallon. The drive was made with a load of oil for use in Yosemite, and fortunately for the party the rain was not followed by snow, else the truck would have been driven out

perhaps months later. As it was the drive proved conclusively that the truck was well built and had abundant power for "going over the top."



F. H. Burdette, Pacific Coast Sales Manager for the Hercules Motor Truck Co., Milwaukee, Wis.

TO CARRY RACE HORSES IN MOTOR TRUCKS.

At the annual meeting of the Bay State Short Ship Circuit, which is an organization of horse owners who race horses in Massachusetts, it was decided to ship the animals from one track to the other during the coming season in motor trucks, because of the uncertainties of transportation from embargoes and congestion.

The Mogul Motor Truck Co., St. Louis, Mo., through its president, George F. Griffith, has made a voluntary petition in bankruptcy in the United States District Court, the liabilities being placed at \$36,816.83, and the assets at \$8885.91. The unsecured claims against the company amount to \$27,903.61.

SUSPEND NEW JERSEY TRUCK LAW.

William L. Dill, commissioner of motor vehicles for the State of New Jersey, has temporarily suspended the truck law that became effective in that state Jan 1 because of the unreasonable provisions of the act. At the next session of the Legislature the law will probably be amended in regard to the restrictions it placed on speeds, load, tire requirements and use of governors. The law restricts the speeds of 3½ and five-ton trucks to 10 and 12 miles an hour respectively; makes it unlawful to carry more than two-thirds of combined weight of the vehicle and load on the rear wheels; makes a low limit of weight per inch of tire width and requires use of governors on all trucks.

LOUISVILLE'S SURPLUS POWER.

The Louisville Industrial Foundation, Louisville, Ky., which promotes the manufacturing interests of that city, has sent out an announcement stating that the Louisville central station has more than 10,000 K. W. surplus electric power for industrial purposes. This condition, the circular states, is due to the fact that the central station owns the mine from which it draws its coal supply and owns its coal cars. Its coal mine is just a night's run from Louisville, assuring a plentiful supply of fuel and continuity of electric power. It also states that Louisville can supply a considerable area of floor space for manufacturing purposes.

JOHNS SUCCEEDS BATTEN.

W. H. Johns, vice president of the George Batten Co., Inc., has succeeded to the presidency of that concern, which is one of the best known advertising agents of New York City. The founder, George Batten, died recently, and Mr. Johns, who was associated with him since 1891, was vice president of the company until his election as president.

TRUCKS FOR WATER BUREAU.

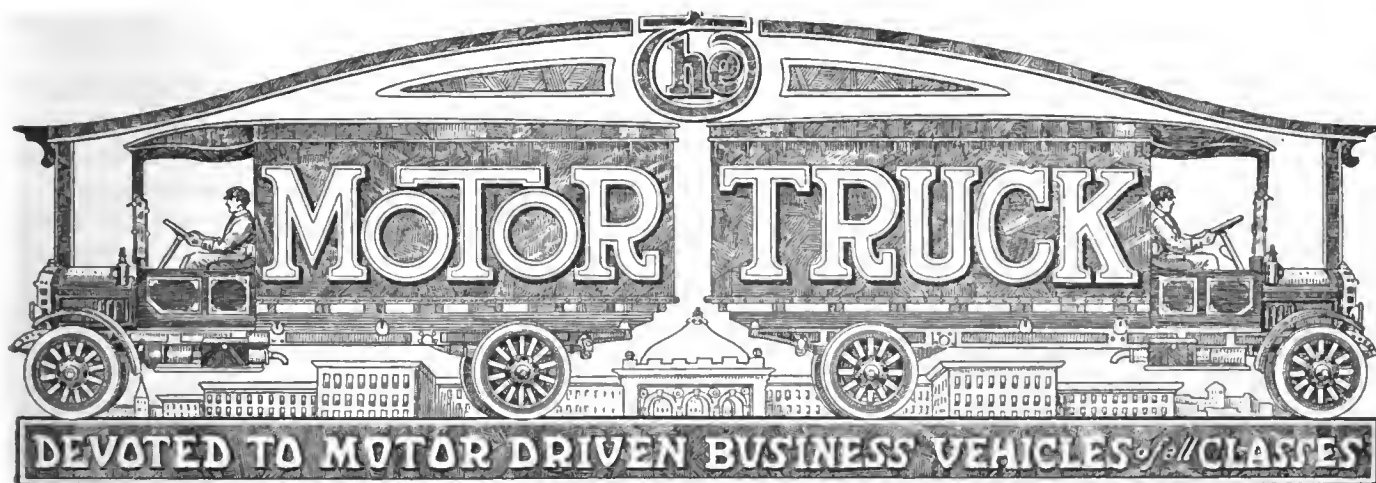
Recommendation has been made the Buffalo, N. Y., city council that six 2000-pound trucks be bought for the water bureau, which now has five trucks and several small power vehicles, that do 75 per cent. of the work. The intention is to dispose of all horses owned by the bureau.

C. S. Thompson has been made manager of the export department of the Four Wheel Drive Auto Co., Clintonville, Wis., succeeding J. M. Homs, who resigned to engage in foreign business in New York City.

The Lackawanna Mine and Mill Supply Co., Scranton, Pa., has made contract to distribute Larrabee-Deyo trucks in Northeastern Pennsylvania.



Fageol 2½-Ton Truck, Driven from Oakland, Cal., to Yosemite and Return, 440 Miles, in 46 Hours by C. L. Butler.



Vol. IX. No. 3.

PAWTUCKET, R. I.

MARCH, 1918

BOSTON'S LARGEST TRUCK SHOW

Exhibits Restricted by Limited Space—Demands Indicate a General Conversion of Haulage Equipment If Units Are Obtainable—Sales Dependent Upon Highway Transportation from Factories

REGARDED from any aspect the exhibition of power vehicles in connection with the Boston automobile show surpassed all expectations. General Manager Campbell had stated that the truck department would attract business men in greater numbers than the division given over to passenger cars, and this opinion was generally shared by exhibitors, but no one believed that the interest that did obtain would be manifested.

Shows of passenger vehicles of today may be said to be exploitation of bodies and equipment, for no one is really ignorant of the general principles of chassis design and construction, although perhaps not well informed as to the details of any given make. In fact, automobile vehicles used for passengers have each succeeding year more closely approached a common or standard type, and originality has been very largely directed to development and perfection of coach work and finish and the arrangement of the equipment to convenience and gratify the users.

One may state with truth that shows of power trucks have reached approximately the same level so far as recognition of practicality and utility are concerned, but designers or constructing engineers have not as yet accepted one general type in the same ratio as have car builders. Yet machines that differ from those that are considered conventional or as representing accepted practise are seldom shown. The manufacturer of trucks today understands that the people must be given what they demand if business success is sought, for rarely are machines bought in material numbers unless service value has been thoroughly established.

The Boston show of 1918 was quite the best of the year

when taken as a whole, and when the truck department is considered it was far superior to any previous exhibition. In 1917 the passenger car exhibition overflowed into a salon at the Copley-Plaza, and the truck division into Horticultural Hall, but being apart from the main display at Mechanics' Hall these did not have the same degree of attention from the visit-



The Stand of P. E. Hawley, New England Distributor of Wilson Trucks, at Which Two Machines, a Stake Platform Body and a Chassis, Were Shown.



Looking Along the Aisle at the Exhibit of the Republic Motor Truck Co. of Boston, Where Six Complete Trucks and Chassis Were Displayed.

ors and the conclusion of the management was that a divided show was not advisable in the time of war. For this reason the exhibition was in Mechanics' Hall alone, which has 105,000 square feet of space available for exhibits, and to admit as many as possible of the applicants the spaces were curtailed and divided wherever this was practical.

Besides the passenger cars and trucks the Motor and Accessory Manufacturers' Association, Inc., for the first time sanctioned exhibition by its members, and as this determination was reached late in the year, but little space was obtainable and a considerable number of applicants were unable to secure stands. The passenger car department and the truck division could not be encroached upon and practically the only part of the show where there was any possibility of readjustment of space was that given over to equipment, accessories and parts.

Truck Department Was Exclusive.

Had the truck department been double the size all the floor area would have been used, for not only were the exhibitors limited as to space and exhibitions, but practically all but trucks were excluded. Even body builders were denied space, and but one concern made exhibition aside from those whose equipment was shown on different chassis. The limitations of the department as compared with the demand were such that most of the manufacturers of series of load capacity chassis were compelled to make display of but one or two sizes. This condition was extremely unfortunate from the viewpoint of the visitor, who desired to see the sizes that were not shown, and necessitated visits to show rooms in other sections of the city. Considering the other attractions of the show and the more or less inclement weather, only intense interest would impel a man to leave the building and seek one particular make, and yet this was the condition that a very large number of prospective buyers experienced at the show.

The interest of business men generally in trucks is

such that there is no good reason why the truck department of future Boston exhibitions should not be greatly increased, which might be possible by giving over the equipment and accessory sections to passenger cars and placing trucks in a part of the space now used for cars. This would necessitate having a separate division, in another building for the smaller displays, but this appears to be the only solution of the Boston show so long as Mechanics' Hall is used. There is no one building in Boston that will house a show of the magnitude of the automobile exhibition, and unless this possibility is con-

sidered the only alternative is to have the truck show earlier or later, provided, of course, that there is a desire to provide for all who might care to have displays and exhibit full series of machines.

Cash Receipts Record Making.

The attendance at the Boston show was larger than at any previous exhibition when measured by cash receipts, for the dealers very generally greatly reduced the invitations sent to prospective customers, or in many instances abandoned the custom, so that the tickets charged to exhibitors was exceedingly small when compared with former years. The number of visitors was sufficiently large to greatly congest the show, especially the truck division, which was well filled practically at all times. As soon as the show was opened mornings the truck department was busy, and the visitors were not there because of curiosity. The dealers and the factory representatives were extremely occupied at all times, and a surprising volume of business was transacted in the salesrooms and elsewhere.

Practically every business man interested in trucks wanted information as to delivery, and the one uncertain condition that had to be dealt with was getting the machines from the factories. A large part of the trucks shown had been driven over the highways from the factories, and there was prospect, according to the dealers, that practically all the trucks that will be sold in New England during the next few months must be driven from the place of manufacture, for railroad freightage, already very slow, would be even more congested and undependable. In fact, the dealers and factory representatives maintained that there was little probability of obtaining cars for vehicle shipments of any kind.

Can Sell All Trucks Obtainable.

"If the factories will give us trucks, we'll sell them," commented the New England agent of one of the large manufacturers. "There is such a demand for machines that I don't see how anything like the

number wanted can be delivered, and there is certain to be a good deal of delay unless we can organize some method of regular road shipments."

This condition must be met by every manufacturer, every branch or agent and by every sub-agent throughout New England, and the main question is with them one of highway transportation. Undoubtedly driving trucks from the factories to Boston and other New England points will be more expensive than railroad shipping, but it is the only certain means of obtaining trucks, even in small numbers. According to the dealers a great deal depends upon the apportionment of the manufacturers. If they will supply the demands of New England for trucks the dealers will assume the responsibility of getting them to the buyers.

Largest Department of Trucks.

With reference to the truck department of the show, it was by far the most representative and satisfactory ever seen at Boston. In all 48 different makes of machines were shown, and the total number exhibited was 116, exclusive of converted passenger car chassis. Of these, five different makers displayed 35 trucks, or very nearly a third, while 44 others showed 81 machines. The White Co., which had six trucks and chassis and three fire apparatuses, was the largest exhibitor. Next was the display of the Pierce-Arrow agent, which consisted of eight machines, and the General Motors Truck Co., the Republic and the Autocar agents each had six machines on exhibition.

The truck exhibitors showed the following makes:

•Acason	G-M-C	•Sanford
•Atlas	General Vehicle	Signal
•Atlantic		•Sterling
Autocar	•Hercules	Stewart
	Hurlburt	
Bethlehem	Indiana	•United
Brockway	International	Velle
		Vim
•Chevrolet	Kelly-Springfield	
Clydesdale	Koehler	White
•Concord		•Wilson
•Columbia	Mack	
•Couple-Gear	Maxim	
Cunningham	•Maxwell	
D-E	Nash	
•Dearborn	Netco	
Denby		
Diamond T	Packard	
•Dodge	Pierce-Arrow	
Duplex		
Federal	•Rainier	
•Ford	Reo	
•Fulton	Republic	

*Shown for first time at Boston.

The exhibitors of chassis conversion units and adapters numbered 10, all of whom showed converted chassis, and in some instances completed vehicles, as follows:

Amesbury	Oxford
Comdelcar	Phenix
Guaranty	Smith Form-A-Truck
G-M-P	Truxton
Maxfer	Will-Holl

In addition to these Troy and

Troy Junior trailers, Hunt industrial trucks, Harley-Davidson motorcycle delivery cars and three farm tractors, Avery, Beeman Garden and Case, were exhibited.

Considering the 116 different truck chassis shown, these were in 15 different capacities, as follows:

1000 pounds.....	2	6,000 pounds.....	2
1500 pounds.....	9	7,000 pounds.....	14
2000 pounds.....	13	10,000 pounds.....	22
2250 pounds.....	1	11,000 pounds.....	1
2500 pounds.....	4	12,000 pounds.....	1
3000 pounds.....	9	15,000 pounds.....	1
4000 pounds.....	26	Fire apparatus.....	4
4500 pounds.....	2		
5000 pounds.....	5	Total.....	116

The exhibits were in large part chassis, the units being in the following very general classifications:

Chassis	44	Furniture body.....	1
Platform bodies.....	19	Road oiler.....	1
Express bodies.....	18	Good roads truck.....	1
Dumping bodies.....	12	Fire apparatus.....	4
Panel bodies.....	12		
Utility body.....	1	Total.....	116
Tank bodies.....	2		

The exhibits included the following:

Acason, 2½ and 5-ton chassis.
Atlas, two 1500-pound panel delivery trucks.
Atlantic (electric) 2-ton platform body truck.
Autocar 2-ton chassis, full panel truck, platform truck, "utility" body truck, dump truck and express body truck.

Bethlehem, 1¼ and 2¼-ton chassis.
Brockway, 2-ton platform body truck.

Chevrolet, 1-ton chassis.
Clydesdale, 1½-ton covered express body truck and 3½-ton chassis.
Concord, 1½-ton chassis.
Couple-Gear (electric), 5½-ton chassis.
Columbia, 2½-ton platform body truck.
Cunningham, two hearses and ambulance on 1-ton chassis.

D-E, 1¼-ton covered express truck, 2¼-ton and 3½-ton chassis.
Dearborn, 1-ton panel delivery truck.
Denby, 3 and 5-ton chassis.
Diamond T, 1-ton chassis.
Dodge, 1000-pound panel delivery truck.
Duplex, 3-ton chassis.

Federal, 2, 3½ and 5-ton chassis.
Ford, 1-ton chassis.
Fulton, 1½-ton chassis.

G-M-C, 1500-pound express truck, 1-ton chassis, 1½-ton chassis, 2-ton coal truck with dump body, 3½-ton platform and 5-ton platform truck.



One End of the Space in Which Four Packard Trucks and Chassis Were Exhibited, These Being in Four Capacities and Three with Special Bodies.

General Vehicle (electric), 2-ton screen side express truck.

Hercules, 3½ and 5-ton chassis.
Hurlburt, 3½ and 7½-ton chassis.

Indiana, 2½ stake platform truck and 5-ton chassis.
International, 1500-pound express truck, 1½ and 2-ton chassis.

Kelly-Springfield, 1½, 3½ and 5-ton chassis and 2-ton tractor chassis.
Koehler, 1¼-ton platform truck.

Mack, 2-ton coal dump truck, 3½-ton chassis and 5-ton oil tank.
Maxim, fire department ladder truck.
Maxwell, 1-ton open express truck, 1-ton covered express truck and 1-ton panel body truck.

Nash, 1-ton platform truck, 1½-ton chassis, 2-ton dump truck.
Netco, 2-ton platform body truck.

Packard, 2-ton furniture body truck, 3-ton platform body truck, 5-ton dump truck and 6-ton chassis.
Pierce-Arrow, 2-ton chassis, 2-ton express truck, 2-ton platform body truck, 5-ton express truck, 5-ton dump truck, 5-ton platform truck, 5-ton platform truck, 5-ton chassis.

Rainier, 1½-ton express body truck.
Reo, 1500-pound express truck.
Republic, 1500-pound chassis, 1500-pound express truck, 1-ton express truck, 2-ton dumping body truck, 3½-ton platform body truck, 5-ton chassis.

Sanford, 2½-ton and 3½-ton chassis.
Signal, 1¼-ton chassis, 2½-ton express body truck, 5-ton dumping body truck, 5-ton chassis.



Part of an Aisle in Department D, Showing a Five-Ton Mack Tank Truck. Behind Which Is a Maxim Fire Department Ladder Truck.

Sterling, 3½-ton chassis, 5-ton dumping body truck, 5-ton chassis.

Stewart, 1500-pound panel body truck, 1-ton platform body truck, 1½-ton chassis and 2-ton chassis.

United, 3½-ton dumping body truck.

Vim, 1000-pound panel body truck.
Velle, 5-ton platform truck.

White, 1500-pound platform truck, 2-ton platform truck, 2-ton dumping truck, 2-ton tank truck, 5-ton street oiling truck, 5-ton Good Roads truck, chemical fire apparatus, protective wagon, fire pump.

Wilson, 2 and 3½-ton chassis.

Amesbury unit, 1-ton chassis.
Comdelcar, 1-ton chassis, two separate bodies.
Guaranty unit, two 1-ton chassis.
G-M-P unit, one 1-ton chassis.
Maxfer unit, one 1-ton chassis.
Oxford unit, one 1-ton chassis.
Phoenix unit, one 1-ton chassis.
Smith Form-A-Truck unit, one 1-ton chassis, one 1-ton express truck, one 1-ton panel body truck.
Truxton unit, one 1½ and one 2-ton chassis.
Will-Holl unit, one 1-ton platform truck, one 1-ton ambulance.

Hunt (electric) industrial truck, one 2-ton truck and one 2-ton truck.

Troy trailers, 2000-pound and 5000-pound units: one 800 and one 1200-pound units.

Troy Junior trailers, 500 and 800-pound units.

Harley-Davidson delivery cars, 300 and 600 pounds load capacities.

Avery farm tractor, 5-10 horsepower.
Beeman Garden tractor, 4 horsepower.
Case farm tractor, 8-16 horsepower.

Exhibits in Street and Salesrooms.

Some manufacturers' agents, who were unable to obtain space in the show, made the best of the condition and exhibited trucks and chassis either at salesrooms or in the street in front of the exhibition building. The Selden Truck Sales Co. rented a store opposite Mechanics' Hall, where a single truck and a chassis were shown, and maintained an omnibus line between the hall and the salesrooms of its agent in Cambridge, while Sales Manager Boulden and his assistants had headquarters at the Copley-Plaza Hotel. Hall trucks were driven about the streets and made frequent demonstrations in the vicinity of the show D-E trucks, Acason trucks, chassis converted with Guaranty and Knox units, the former including a dumping body and the latter semi-trailers, were exhibited in the street. Inability to obtain space precluded exhibits of Riker, Overland, Kissel and Buick trucks, and undoubtedly other makes were not shown because of the same reason.

The encroachment of the visitors upon the exhibition spaces during the afternoon and evening was noticeable and this interfered to a considerable degree with transactions, for men who are buying desire to have sufficient room to conveniently examine machines, and they wish to be free from interruptions, which was naturally a result of the congestion due to the large attendance. The management of the exhibition, which is one of the great successes of the motor vehicle industry, cannot be criticised. There is no doubt that the conditions were keenly realized, but these cannot be materially changed until the truck show is held in large space or separate from the exhibition of pleasure cars.

Magnitude of the New England Market.

The magnitude of the market represented by the New England states is little realized save by those who have made careful study of the conditions and who understand the possibilities by representation in the different commercial centres. One of the largest truck manufacturers of the country, producing a full series of sizes from 1500 to 10,000 pounds load capacities, has in New England and the Canadian maritime provinces (New Brunswick and Nova Scotia), 63 different agencies outside of its branch in Boston, and all of these are productive. The organization this company has in this section of the country alone, and

which is amply justified by business, is larger than many concerns have in the entire country.

Intensive development of business has almost unlimited possibilities, as is abundantly proven with the company referred to, and there is no reason to believe that there are not equal opportunities for manufacturers who have the production facilities and the enterprise to exploit a market where the business men are very rapidly converting animal drawn to power driven transportation equipment. The New England states now have in service close to 50,000 trucks and converted passenger car chassis, this being a gain of approximately 15,000 machines for the year of 1917, and this is about 15 per cent. of the total number used in the United States. There is the best of reason to believe that the states will absorb at least 250,000 machines. This is based on the fact that there are about 125,000 concerns that are logical prospective buyers.

Large Highway Freightage Possibilities.

No section of the country has such freightage possibilities. The highways are the best of the country and have the largest percentage of improved surfaces. The states are expending larger amounts for highway improvements than any of the other states, simply because of the demand from the people for the best of road transportation. There are in these states no less than 250 different communities with populations of 5000 or more, and haulage between these and the different large shipping points and commercial centres must be continuous. By this is meant that the traffic continues throughout the year without reference to seasons and the railroads cannot be expected to meet the requirements for rapid transportation.

Industrially, New England has developed remarkably. One reads of the material progress made by some of the western cities, but there is little realization that in the New England states there is little agriculture and many of the textile companies are operating enormous plants that must have constant supplies of fuel and raw material, and which must ship finished products, to say nothing of the demands of the population for food and other necessities. All of these must be supplied in bulk and then distributed, so that there is a greater volume of highway haulage than would be experienced in any other section of the country.

This explanation is made that those who are not informed as to the conditions may understand why the Boston show has been more than ordinarily productive this year and why the truck dealers have without exception to deal with the problem of getting

trucks from the factories in the West.

Truck Deliveries Influence Buying.

The exhibitors at the show found that hundreds of visitors wanted trucks as quickly as they could obtain them. Many of the prospective buyers were men who had not been able to get satisfactory delivery dates for tentative purchases and hoped to be able to find concerns that could make earlier deliveries. A considerable proportion of the demands were from men who were not unwilling to accept any one of a number of what they regarded as standard makes of trucks if it could be delivered earlier than another of approximately the same quality. While they undoubtedly had a choice, they realized that many trucks are built of practically the same construction units, different mainly in details of design. Undoubtedly every designer or constructing engineer has satisfactory reasons for the practise he adopts, there can be no denial of the fact that trucks as a whole are very close to what may be regarded as a generally accepted type.



Another Aisle in the Main Truck Department, Looking Between the Stands of the White and the International Harvester Companies, Two of Largest Exhibits Shown.

To illustrate, a four-cylinder engine is standard, and in the Boston show the only other types were the two-cylinder engines of the Autocar chassis, the six-cylinder engines of the Maxim ladder truck, the White Good Roads truck, the 7½-ton Hurlburt truck, the Hercules chassis and the eight-cylinder engines of the Cunningham hearses and ambulances. In all of the 116 chassis there were six two-cylinder, five six-cylinder and three eight-cylinder and 102 four-cylinder. This is a sufficient indication of the opinions of engineers, and without question they base their conclusions on knowledge of the requirements of the people.

Many Types of Special Bodies.

The truck buyer does not as a rule care for anything else than service. The service may be such that ornate bodies are desired because of their advertising value, but with rare exceptions endurance is the determining factor. Dependability means that haulage, transfer and distribution can continue uninterrupted, which will decidedly influence custom. There were

many instances of high grade coach work in body construction and ornamentation, but practically every finished body was a special work in the sense that it was for exhibition purposes before actual use, and no doubt this had been a potent factor in the minds of the truck agents and owners.

While no freak constructions were exhibited so far as the trucks were concerned, practically every completed body was evidence of careful thought in designing and constructing. For instance, many chassis had bumpers or guards to protect the radiators and in several cases both bumpers and guards were installed. Some of the cabs are equipped with tool compartments that can be conveniently reached by the drivers while standing beside the trucks, head or dash lamp brackets are heavier and more certainly enduring, fenders are in single pieces and are carried on heavy drop forged brackets, spring hangers are heavier and fitted with more positive means of lubrication, radius rods are more nearly horizontal, so that when loaded the propelling thrust practically parallels the line of the chassis frame, and one might continue through the entire details of chassis assembly, showing wherein construction has been improved. But the fact remains that with all of the machines the principal units, the engines, clutches, gearsets, shafts, universal joints, rear and front axles, springs, steering gears, frames, radiators and brakes are mainly produced by specialists, for a comparatively small proportion of manufacturers build their engines, and a still smaller number construct their axles, clutches, gearsets and other units.

Knowledge of Trade Names.

The value of knowledge of the people of power vehicle construction units was never so well demonstrated as at the Boston show, because there was no need for the salesmen going into mechanical explanation to convince inquirers of the quality and economic values of the parts produced by specialists. With rare exceptions the visitors understood the quality of each unit, at least to such a degree that a statement specifying a trade name carried with it a known quality that was accepted as having been proven by service and guaranteed by the manufacturer.

This was particularly true with reference to machines that were shown for the first time at Boston. The salesmen stated with every confidence the trade names of the construction units, which were generally known to the inquirers, and there was no need of explanation of the merits of these. The greater time was required for description of the details of assembly, because each engineer has sought to build to obtain simplification and accessibility and to insure endurance by having abundant factors of safety.

Much Interest in Conversion Units.

There was a great deal of interest manifested in the different forms of chassis conversion units, with which differing types of passenger car chassis can be lengthened and strengthened to have load capacities

from 1000 pounds to 4000 pounds, and with which really serviceable vehicles can be constructed. As stated, no less than 10 of these units were shown, all of them with converted vehicles, and most of these with bodies, to demonstrate the practical possibilities of reconstruction. Some of these were types in which the bevel gear drive is abandoned and internal gear drive utilized, this insuring sufficient gear reduction and protection of the gears against abrasives and consequent wear, as well as obtaining the strength that is necessary. Others are designed to convert Ford chassis by extension frames and parts and changing the method of drive, or by converting the driving axle so that it is a three-quarter floating type instead of semi-floating, having increased strength because the load is largely borne by the wheels. Because of the great demand for trucks and the anticipated delay in obtaining delivery of the smaller sizes, as well as the cost of obtaining them when driven overland, not a few who desire small machines gave considerable attention to the conversion units and the practicality of their use with passenger chassis.

A Tractor-Sled Attachment.

One of the oddities of the show was the snow attachment built by the Automobile Snow Attachment Co. of West Ossipee, N. H., in the White Mountains. This is a device intended to adapt a Ford car chassis for work in snow. The front wheels are removed and replaced by two runners having hubs that are placed on the axle spindles, this following the old custom of fitting hubbed runners to horse vehicles. A second pair of wheels on a straight axle, not unlike a regular horse vehicle's rear axle, on which is seated a pair of full elliptic springs, is placed ahead of the rear axle, being kept in position by radius rods, and the upper halves of the springs are clamped to the chassis frame. Two endless belts, having a series of U-shaped lugs inside, bolted through wooden cleats on the outside, are placed around the four rear wheels, forming track-layer treads on either side. The belts are given such tension that when the regular driving wheels are turned the belts and the wheels ahead of them are turned, and the tracks move as the wheels revolve, the cleats pushing the vehicle ahead. The claim is made that in deep snow the light car becomes a tractor-sled that can be driven easily and with considerable speed, especially on roads which could not be traversed by automobiles. The manufacturer offered a standing wager of \$200 that no automobile could follow the machine on a snow covered road selected by him.

The farm tractors were constantly surrounded by greatly interested visitors. They were small machines, especially adapted for work on farms of moderate size, but the Beeman tractor, which is guided by the operator, who walks behind it, was regarded as being extremely useful on very small tracts. From the opening to the closing of the shows the tractors were demonstrated, and there was a very general

awakening to the possibilities of power farm machinery that will no doubt be extremely productive. While only three tractors were shown, they attracted more real interest than any other machines in the show, and there was very general belief that within the next two months there will be a record breaking sale of these units in New England, provided they are obtainable.

AUTO PLANTS ON WAR WORK.

Contracts for production of completed trucks, cars, chassis, construction units or parts for the Quartermaster Corps of the War Department have been made with 37 different concerns actively operating in the industry, producing either trucks, cars or motorcycles normally. These contracts have been made through the Automotive Products Section of the Council of National Defense, of which H. L. Horning is chairman, and does not include tractor contracts.

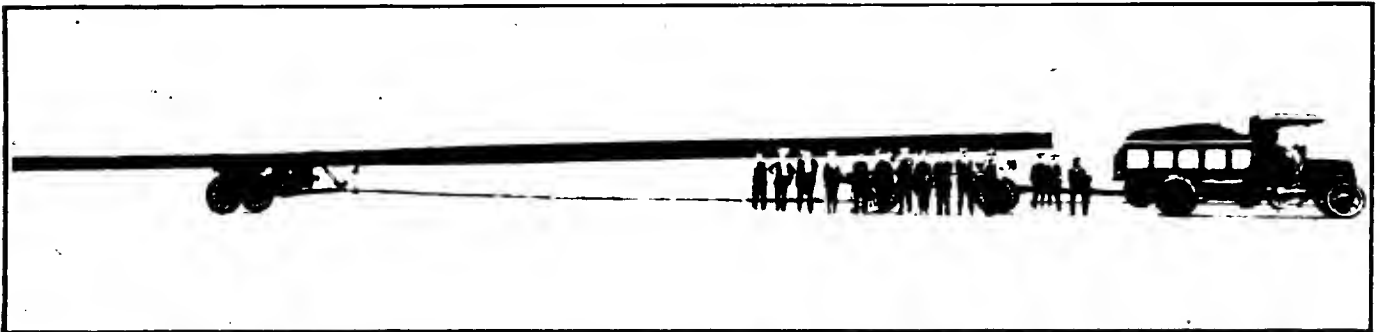
Of this total the Cadillac Motor Car Co., the Commerce Motor Car Co., Dodge Brothers, Denby Motor Truck Co., Federal Motor Truck Co., Hudson Motor Truck Co., Packard Motor Car Co., Paige-Detroit Mo-

TIRE COMPANY'S BIG EARNINGS.

The annual report of the Kelly-Springfield Tire Co. shows that the net income for the past fiscal year was \$2,648,913, which amounts to more than 12 times the preferred stock dividend, and after paying that dividend leaves more than three times what is paid on the common stock. The estimated war taxes of the company are \$429,570, which, after all possible charges, leaves 40.86 per cent. on the common stock. The total current and working assets are placed at \$6,605,499. The surplus and working capital is \$5,575,633, which is about \$800,000 in excess of the common stock and \$2,200,000 in excess of the preferred stock. During the year the company distributed \$121,943 to its employees in profit sharing and purchased \$484,960 of its common stock for resale to employees under the profit sharing plan. Bonds were reduced \$248,900.

AUTO WORKERS DECREASE.

According to an investigation conducted by the Federal Bureau of Labor Statistics during January in



A Peerless Truck Used as a Tractor and a Two-Wheel Trailer Transporting a Girder 85 Feet Long and Weighing 10 Tons Used in the Construction of a Building at Providence, R. I.—The Haulage Contractor Was Joseph McCormick, East Providence, Agent for Peerless Trucks.

tor Car Co. and the Standard Motor Truck Co. are of Detroit, the General Motors Truck Co. of Pontiac, Mich.; Republic Motor Truck Co. of Alma, Mich., and the United Motors Co. of Grand Rapids, Mich. Dodge Brothers is building both cars and trucks to contract, but the other concerns are producing trucks only.

TRUST COMPANY IS RECEIVER.

Judge Fred S. Lamb of the United States District Court has appointed the Detroit Trust Co. receiver for the American Truck Co. of that city, which has been adjudged bankrupt. The petition for the receivership was filed by Thomas Economy, a creditor. The receiver is authorized to continue the business of the company.

Because of the success attending the exhibition of trucks in connection with the Milwaukee automobile show the truck dealers of that city are now planning an exclusive truck show, to be held in October.

13 different industries but three showed an increase in number of workers, and 10 showed a decrease, the greatest of which was in automobile plants, in which there was 10.4 per cent. shrinkage as compared with the same month in 1917. There was a corresponding loss in pay rolls in the automobile industry.

PEERLESS CO. TO RETIRE NOTES.

The holders of the six per cent. convertible notes of the Peerless Truck and Motor Corporation, Cleveland, O., have received notice that the company will expend \$750,000 in purchasing these notes, to retire them, payment to be made by the Bankers' Trust Co. after March 26.

CONTRACT FOR 1500 TRUCKS.

The Commerce Motor Car Co., Detroit, has contracted to build 1500 one-ton trucks for the United States War Department, and production will be begun at once. The total value of the contract is \$1,500,000.

Trailer Economy in Quarry Work

Saving of More Than 50% with Three Units and No Lost Time

The business man who is operating on a comparatively small scale frequently judges that material economies are only practically possible when operations are considerably larger, for he usually is willing to believe his own judgment with reference to his own service is better founded—that is, it is based on experience and the theory of others cannot well be applied. There are well established principles that cannot be denied, however, and one of these relates to the economy of time and another to the saving of labor.

This statement has to do with the experience of Hugh G. Williams, miner and manufacturer of roofing slate at Granville, N. Y., whose quarry is located a mile and a half from the siding of the railroad by which practically all of the slate manufactured is shipped to customers. The slate is taken from the quarry, split and cut to sizes, and made ready for use. It is used by contractors and builders in the northeastern section of the country and the demand for it, as with all building material, varies according to the season.

Mr. Williams used animals for years and his haulage equipment was costly, even for the country where feed and maintenance expense would be considerably less than in cities. Then he purchased a Mack truck and used this as he had horses, the machine making regular trips between the quarry and the railroad siding, the loading and unloading being done with reasonable expedition, but with loss of the time of the machine while standing, and, of course, more or less unproductive time of the driver. This was the custom with animals, however, and it appeared logical enough until the necessity of economizing the loss became apparent.

According to Mr. Williams' statement, he hesitated for nearly two years before he concluded to utilize trailers, principally because of the initial investment and the uncertainty that these would effect a justifiable economy. He considered carefully the uses that could be made of them and then made decision to buy three five-ton units, purposing to have one loading, one unloading and one on the road between the quarry, either loaded or unloaded, during the working hours of the day. This plan was carried out and after the truck and the trailers are driven from the yard to the quarry and the railroad each morning the only time the truck is idle is when coupling and uncoupling the trailers.

No loads are carried on the truck because the slate must be hand handled to prevent breakage and damage, but each trailer is freighted with six tons, and the crews at the quarry and the railroad siding can load and unload and rehandle the slate in approximately an hour. After the first loading in the morning (unless a trailer is left loaded over night) the truck is driven approximately two round trips an hour, hauling six tons each trip one way, and hauling an unloaded trailer each trip one way.

The truck makes 60 miles a day on an average, and hauls about 120 tons one way, or about 180 ton miles, for the haul is $1\frac{1}{2}$ miles and the return is with the empty trailer. While 30 minutes may appear to be slow time for a three-mile trip, this includes coupling and uncoupling the trailers and hauling in and out of the quarry and the railroad yard. Besides this the roads are not improved, the grades are steep and some of the turns are very sharp, so careful driving

is necessary. Mr. Williams maintains there is now no lost time, either loading, unloading or hauling, and he states that he has reduced the actual haulage cost more than 50 per cent. of what it was when the truck was used for carrying instead of hauling. Although careful driving is essential this does not lessen the utility of the truck.

Mr. Williams states that the average fuel consumption of the truck is a gallon to four miles, and he has found the other items of expense extremely reasonable. He has had no failure of the truck and the trailers have been entirely satisfactory.

GUILFORD CO. WILL MOVE.

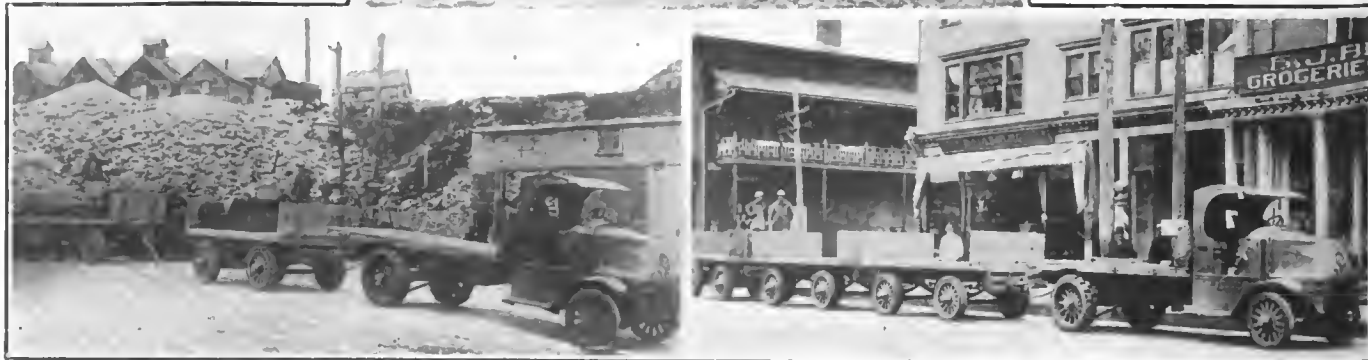
With the location of a factory at Greensboro, N. C. the Guilford Motor Truck Co., which was recently organized at Martinsburg, W. Va., will be removed to that city. The Guilford company has plans to produce a one-ton truck with 130-inch wheelbase, worm driven, with electric lighting and starting system, which will be sold for \$1075.

FLECHTER GETS CONTRACT.

L. V. Flechter & Co., New York City, manufacturer of Flechter carburetors, has made contract to supply the carburetor equipment for all trucks produced in 1918 by the Hurlburt Motor Truck Co., New York, N. Y., which has planned to build 1800 trucks of different capacities during the present year.

SHIPPING CARS ON TRUCKS.

Because of the satisfaction with an experimental shipment the Peerless Motor Car Co., Cleveland, O., is to send transportation trains overland to New York and other eastern cities that will consist of trucks each carrying a passenger car. This plan may be extended to include the general distribution of cars from the factory where the same number of cars and trucks are to be delivered within a reasonable distance from the destination. The first train shipment proved that the cost was no greater and the time faster than if sent by express.



Trailer Economy in Quarry Haulage: Above, Making a Sharp Turn on a Steep Grade with a Full Load; Lower Left, the Truck Starting for the Ledge with an Unloaded Unit; Lower Right, the Truck and Three Trailers Starting for the Quarry to Begin the Day's Work.

MUST HAVE MORE CAPITAL, OR—?

The stockholders of the Signal Motor Truck Co., Detroit, have been informed by the officers that more capital is required to carry on the business profitably, and that a proposition has been made whereby \$250,000 will be furnished by other interests, provided that the stockholders will consent to the decrease in value of common stock from \$10 to \$5 a share, each stockholder to be entitled to one share of the reduced value stock for each share of common stock now held, and that the balance be given for the financial assistance; that the management and supervision of the company for the period of agreement be vested in the financial interests, which will receive 2½ per cent. of the gross business revenue of the company as additional compensation; that the common stock of the company be increased by 50,000 shares of \$5 value, to be sold by the financial interests at not less than par, the proceeds of the sale if consummated to be placed in the treasury for the profit of all stockholders. A further provision is that all preferred stockholders shall waive dividends and all rights thereunder until Sept. 1, 1918.

The stockholders have the option of continuing the company or selling it to the Paige-Detroit Motor Car Co., which has made an offer for the business. Decision will probably soon be reached.

ESSENKAY IN NEW BUILDING.

The Essenkay Products Co., because of the large demand for Essenkay tire filler, has found new facilities for production necessary, and has leased a five-story building at 220-22 West Superior street, Chicago, Ill., which it will occupy May 1. This will afford much larger space and with new machinery that has been built to special designs made by the mechanical engineering department, a much larger daily output will be possible. Essenkay tire filler is used for both passenger car and truck tires.

ADD TO SERVICE CO. PLANT.

At the plant of the Service Motor Truck Co., Wabash, Ind., two new structures are building which will be completed shortly after May 1. One of these is 225 by 75 feet and will be a machine shop, and the other will be an assembly shop 425 by 80 feet. This will considerably increase the production of the works.

Jesse G. Vincent, formerly engineering expert for the Packard Motor Car Co., Detroit, who is now chief engineer of the Aircraft Production Board and stationed at Dayton, O., has been promoted from major to lieutenant-colonel.

The manufacture of a steering gear of the split nut type for truck construction has been begun by the Wohlrab Gear Co., Racine, Wis.

GREENLEAF CO. EXPANSION.

The Greenleaf Co., advertising and merchandising counsel, which was established April 1, 1915, and which has increased its business with great rapidity, makes announcement that beginning April 1 it will occupy an entire floor of the Christian Endeavor building, 41 Mount Vernon street, Boston, Mass.

The company is composed of A. E. Greenleaf, Henry Knott and G. R. Dunham, all of whom have been identified with advertising, publicity and promotion enterprises in Boston for long periods, and who are extremely well known. This concern directs the advertising campaigns of some of the largest industries of New England and has been extremely successful with these, a fact that is best evidenced by the constant expansion of the offices.

EMINGER IS SALES DIRECTOR.

C. F. Eminger, for a considerable period sales manager for the Splittdorf company of California, has resigned to



Train of Clydesdale Trucks, Some of Them Freighted with Smaller Chassis, Starting from the Factory at Clyde, O., for a Drive to New York City.

become director of sales for the Dayton Electrical Manufacturing Co., Dayton, O. Mr. Eminger, who sold the first electric lighting and starting systems for automobiles on the Pacific coast for the Apple Electric Co., Dayton O., is the pioneer salesman for power vehicle electrical systems. The Dayton Electrical Manufacturing Co. is to produce starters for Ford cars and power boat lighting outfits to new designs and on an extensive scale.

Harry A. Conlan has been made sales manager of the Acason Motor Truck Co., he having been assistant to Vice President and Director of Sales J. F. Bowman of that company. Mr. Conlan was formerly assistant sales manager of the Federal Motor Truck Co., and sales manager for the Detroit Truck Co., before joining the Acason organization.

Contract for the distribution of United States trucks in Western Pennsylvania has been made by the Wyckoff Motor Sales Co., Pittsburgh, Pa.

Clydesdale Trucks Carry "Little Brothers"

The experience of practically all manufacturers of trucks is shared by the Clyde Cars Co., Clyde, O., maker of Clydesdale trucks, so far as making shipments of machines to distributors is concerned. The materials and the fuel essential for manufacture are delivered to the factory by railroads, but when the machines have been built only those that are sent long distances are shipped in cars. In fact, the delay incident to obtaining cars is considerable, and when to this is added the retardation from congestion, the time required for delivery is frequently months instead of weeks.

Naturally with railroad transportation reduced to comparatively a few miles a day there is more pressing need for trucks and buyers are insistent upon de-

livery being made as rapidly as is possible. The only certain means of distributing the machines is by driving them over the road, which requires that a crew be sent to the factory or from the factory, transportation either going or returning being by railroad.

One man to a truck is the smallest number that can be sent with a caravan, but where the sizes of the units will permit small machines can be carried by the larger, this considerably reducing the expense for men as well as the fuel. The accompanying illustration shows a train starting from the Clyde plant for Pittsburgh, when the roads were covered with at least a foot of snow.

As will be noted two of the large trucks carried smaller chassis, which were "nested" on them securely, the weight being approximately what would be capacity loads. In every instance where machines have been driven overland satisfactory time has been made and the trucks were in good condition when received by the distributors. The main result has been reasonably quick delivery, which would not otherwise be possible.

The Autohorse One-Wheel Tractor

***Coupled to Trailer Axle,
Has High Efficiency
Where Work Area
Is Limited***

HAULAGE capacity of the Autohorse, a single wheel tractor unit, built by the One Wheel Truck Co., St. Louis, Mo., has been demonstrated very satisfactorily in different service in that city during the past year, particularly through the autumn and winter months. The company has standardized its design and is now producing these machines commercially. The Autohorse is comparatively small, weighs approximately 4150 pounds, and because of its construction can be worked in extremely limited area. Statement is made that the tractor and a semi-trailer of 10,000

is installed in the centre of the turntable and on this is mounted the power plant and the auxiliaries and the cab. The power plant or cab frame is constructed of pressed steel and one will note the peculiar form by reference to the illustration of the top of the stripped tractor unit. The front is straight and at either side the frame is formed with diagonal lines to the side members, which are parallel to a point back of the mid-section, where they narrow slightly to the rear member, which is straight and parallel to the front. This frame is wider than the main frame and overhangs it at either side, and being about the same length is extended beyond it forward.

The power plant frame is mounted on two semi-elliptic springs, one at either side of the single wheel, and the engine, clutch and transmission gearset in a unit are installed at the right side, while at the left side is a radiator, through which the water is circulated. The ra-

and when it is coupled to a semi-trailer equipment equilibrium is maintained without stress of any kind upon the machine or its frame. Because of the fact that it is not subjected to distortion, and practically all of the weight centred beneath the single driving wheel, traction is practically positive at all times and there is no possibility of skidding. The arrangement of the power transmission system is not conventional, but it is none the less efficient.

The tractor as seen at the side appears low, but as a matter of fact it has more than ordinary clearance, and with the single wheel driving there is more probability of avoiding road obstructions than with two wheels. With the traction wheel centred between the wheels of the semi-trailer the ruts and other obstacles can usually be avoided.

Engine a Four-Cylinder Continental.

The power plant is a Continental four-cylinder, water cooled engine, with cylinder bore of $3\frac{3}{4}$ inches and stroke of five inches, this being rated at 22.50 horsepower by the S. A. E. formula, but will develop close to 30 when driven to maximum capacity. This engine is built with a detachable water jacket head and the cylinders are cast en bloc. The crank case is cast in two sections, the upper being divided by a vertical transverse web that carries the centre main bearing. The lower section serves as an oil reservoir. The water jacket of the engine block is cast integral with the cylinders and the chambers are large and free circulation of water is obtained.

The crankshaft is a three-bearing type, of large size, drop forged from special steel with the flywheel flange and thrust flanges at either side of the centre bearing integral. This is heat treated and ground to size. The camshaft is three-bearing, drop forged, with the cams integral. The cams are ground with unusual care. The timing gears are helical and are noiseless. The crankshaft, camshaft and connecting rod bearings are nickel babbitt, the crankshaft and connecting rod bearings being carried in bronze cages. The connecting rod caps are adjusted with steel shims. The valve mechanism is enclosed to protect it against the action of abrasives.

Cooling and Lubricating Systems.

The engine is lubricated by a horizontal plunger pump driven by an eccentric from the camshaft that forces oil from a screened intake in the well in the reservoir in the base of the crank case through copper tube to the rear main bearing and the timing gearset, both of which are flooded. The excess oil flows to the troughs in the crank case, whence it is distributed by splash to the cylinders and piston, the connecting rod and camshaft bearings, the cams and tappets and the centre main bearing. The overflow from the troughs is carried back to the reservoir to be again circulated. The engine is cooled by a circulation of water forced through the cylinder jackets by a rotary pump and through a cast radiator of special design that has a very large radiating surface. Radiation is promoted by a fan carried on an adjustable bracket on ball bear-



(Patent Pending.)
Autohorse One-Wheel Tractor Coupled to a Horse Drawn Vehicle, Practically All of Which Can Be Used for Practical Haulage.

pounds load capacity will be at least four feet shorter than a team of horses and a truck, and as it can be backed or turned in any direction, or it may be swung 180 degrees and while driving ahead push the trailer backward, it has a degree of mobility that is not obtainable in other type of tractor.

The Autohorse chassis consists primarily of a short U-shape frame, the curved end being the front, the rear ends of which are joined by a cross member, the corners being heavily gusseted. The frame is heavy pressed steel and is very rigid. The frame has a second cross member about midway of its length, and on the forward section is bolted a large external ring gear that is part of a turntable. The large pinion on the lower end of the steering column meshes with this ring gear and by turning the steering wheel the machine is controlled. This will be detailed further on.

The single driving wheel of the tractor

diator is large, because the work is slow and ample radiating surface is necessary, and the weight of the water serves to balance the power plant. One will note from the illustration that the drive is unusual. The main shaft of the transmission gearset carries a bevel gear that meshes with a similar gear on the right end of a transverse shaft that is carried on heavy brackets. On the left end of this cross shaft is a sprocket, and from this a chain extends forward to a sprocket on the left side of the axle of the wheel, this axle being fixed in the wheel hub. In other words, the construction is such that the drive is around the wheel, instead of directly back. The driving chain can be enclosed with a guard so that it may be constantly lubricated and protected from all abrasive substances.

All Weight on the Drive Wheel.

The weight of the tractor is so equalized that it is balanced on the one wheel

ings, mounted on the forward end of the cylinder block, that is driven by a flat belt from a pulley on a forward extension of the pump shaft. The radiator is so positioned that it is fully protected. The source of ignition current is a high-tension magneto and the fuel is supplied through a model M Stromberg carburetor.

The clutch is a Borg & Beck dry disc type, having steel discs 10 inches diameter, that is completely enclosed and requires comparatively little attention. The bearings can be conveniently lubricated and the adjustments, required at infrequent intervals, can be easily and quickly made. The transmission gearset is a Warner construction, having three forward speed ratios and reverse, designed for heavy duty and having the conventional control.

The Power Transmission System.

The main shaft of the transmission gearset drives the cross shaft of the driving system, the bevel gears being completely enclosed. The cross shaft is carried in two heavy brackets and the drive from the sprocket on the left end of this shaft to the driving axle and wheel is by a heavy roller block chain. The speed of the tractor depends upon the reduction ratio of the sprockets.

The ends of the axle fixed in the hub of the driving wheel are mounted in bearings carried above the centres of the heavy alloy steel springs, 42 inches long and three inches wide, and on the springs is a platform that carries the forward end of the main frame. The construction is such that the power plant frame and the platform are the upper and lower members of the turntable, between which is the forward end of the chassis frame, on which is carried the large external ring gear. The steering gear consists of a 22-inch wheel on a column mounted vertically on a cross member of the power unit frame, on the lower end of the column being the pinion that engages with the external ring gear. Because of the gear ratios the power is greatly compounded and by turning the steering wheel in either direction the power plant unit may be turned complete circles, pivoting on the 10-inch solid tire of the driving wheel.

The Mobility of Control.

The machine can be driven or backed as desired. One will understand that the only limitations to pivoting the entire tractor are the sides of the trailer, but the power plant unit can be turned a full circle as frequently as desired. With the driving wheel at an angle of 90 degrees the tractor can be pivoted on one of the two front wheels of the trailer, and when coupled to the trailer the tractor can be driven in a circle so that the trailer will pivot on one wheel in its own length. This statement is made to demonstrate an unusual fact: That the driving wheel of the power plant unit may be turned in one direction, the rear wheels of the tractor at right angle to the driving wheel, and the rear wheels of the semi-trailer at right angle to the rear wheels of the tractor. The tractor and a semi-trailer can be backed to a curb, the tractor turned to parallel the

curb and the power unit and driving wheel parallel to the semi-trailer. This is a decided advantage when the space for haulage is limited. Examination of the illustration of the power plant assembly will establish the manner and the ease of controlling the tractor.

How the Unit is Coupled.

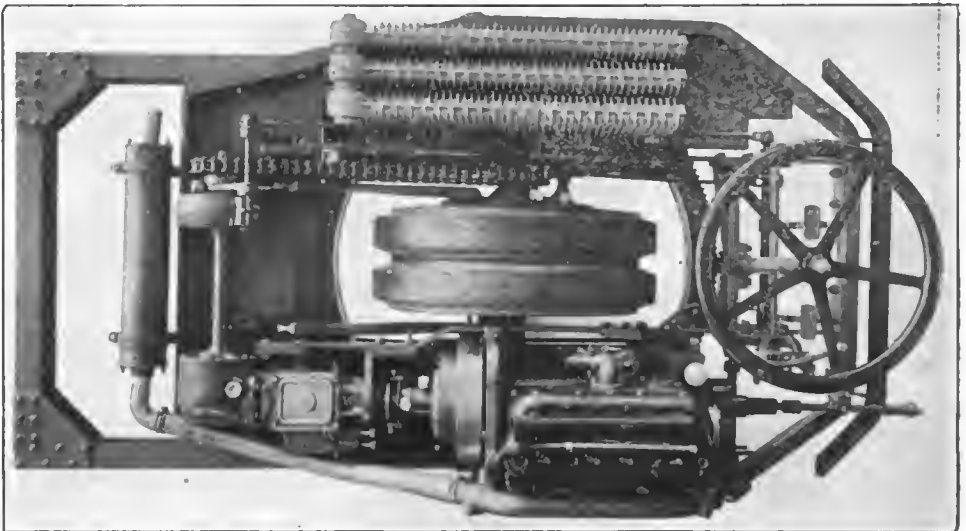
The tractor, though driven by and with practically all the weight on one wheel, obviously cannot be balanced so that it will support the loaded forward end of a semi-trailer, which is approximately a third of the weight of the entire load, and the rear end of the machine must be carried on two wheels, this making three points of support. Any four-wheeled vehicle that has a turntable, that can be coupled or uncoupled by jacking the forward end, can be converted very practically and cheaply. Two long steel plates with vertical yokes that can be clamped to the front axle of the vehicle are bolted to the side members of the main frame of the tractor, these serving as stub shafts, and the tractor as a horse. From one point of view the tractor is coupled to the trailer as is an

control are always positive. The control of the tractor is centralized at the forward end, the service brake pedal being at the left side of the steering column, the clutch pedal and the gear shifting and emergency brake levers at right side, all being directly under the wheel.

The steering column is centred in the forward end of the power plant unit, and the driver's seat is between the engine and the radiator, both of which are shielded, and the cross shaft and the driving chain are covered. The cab is built on the frame of the power plant unit and so designed that it is entered at the left side of the forward end. A dash at the front of the frame is extended with a windshield to the bonnet of the cab, the driver having full protection against storm, and curtains may be lowered to enclose the sides in cold weather. The windshield may be adjusted to meet all driving requirements.

High Grade Construction Material.

A good deal of attention has been directed to obtaining endurance and long service life. All the bearings, aside from those of the engine, are the SKF self-



(Patent Pending.)

Top View of the Autohorse Chassis and Power Plant, Showing How the Single Wheel Serves as a Pivot for Turning a Complete Circle.

animal to a wagon or cart.

The control of the tractor is conventional in that it has the usual clutch and service brake foot pedals, gear shifting and emergency brake hand levers, and the customary control of the fuel supply and the ignition current. The service brake is an external contracting type, having a single band shoe enclosing a large wide drum on the cross shaft near the driving sprocket. The driven sprocket is on the single axle, at the left side, and at the right side of the wheel is the emergency brake, this being a large internal shoe expanding within a wide drum.

The Means of Control.

The traction wheel is wood, has 11 spokes $2\frac{1}{2}$ by three inches and it is shod with a single tire 10 inches width, to which the drum of the emergency brake is bolted. There is no variance of load upon this wheel aside from that from consumption of fuel. Because there is no differential gearset there is no possibility of skidding and the steering and

aligning type and are unusually large size. All the driving gears are chrome nickel steel, with the hubs and bores accurately ground and double heat treated. The axle and cross shaft are 15-25 point carbon $3\frac{1}{2}$ per cent. nickel steel, heat treated and accurately ground to size. All the wearing surfaces are large area and much attention has been given to adequate lubrication. The tractor is equipped with high grade oil dash and tail lights and a speedometer, and a good kit of tools is provided.

The officials of the St. Louis, Mo., fire department have now one tractor in service and 12 others have been ordered. The tractor now in use was subjected to very interesting tests before it was purchased, these including hauling a fire engine of horse drawn type that weighed 9475 pounds. The machine attained a maximum speed of 22 miles an hour, and with the fire engine was driven up and backed down steep hills with grades ranging from 10 to 20 per cent., and was stopped and started on these grades.

Hercules Trucks Built in Four Sizes

Will Be Sold by a D'istinct Organization Composed of Business Men

The Hercules Motor Truck Co., Milwaukee, Wis., has been organized to sell Hercules trucks, having capital of \$100,000, and the purpose is to create a sales organization that will have representation in all the principal commercial centres of the country. The company will sell the production of the Stegeman Motor Car Co., which for a number of years has built machines under the trade name of Stegeman, so that Hercules trucks are really well known, the only change

sure maintenance of even a higher standard of quality. The service department will be developed to care for the trucks built the past seven years, as well as those that will now be produced.

The accompanying illustration was made at the dinner and it shows, from left to right, standing: W. F. Dunlap, advertising counsel; Lynn S. Pease, secretary and treasurer; Adam Mayer, president (treasurer of the Mayer Boot and Shoe Co.); Arthur Davidson, director (vice president and sales manager Harley-Davidson Motor Co.); seated, left row, front to rear: B. H. Hedley, service manager; A. J. Fisher, sales department; Herman Bauer, sales department; A. J. Tank, chief engineer; Fred Gettelman, vice president (Gettelman Brewing Co.); J. T. Turk, sales department; F. H. Parker, director (president Mueller & Sons Box Co.); F. H. Burdette, sales department; right row, front to rear: J. K. Sinyard, director and superintendent; Glenn Rix, sales department; E. Fellows, general foreman; F. J. Chlupp, sales department; T. D. Francey, manager credit department; Willam David-



The Executives and Department Heads of the Hercules Motor Truck Co., and the Stegeman Motor Car Co. at a "Get-Together" Dinner.

being in the name. The Stegeman company has capital of \$200,000 and is well established, having ample facilities and abundant resources.

The policies of the Hercules company were stated at a banquet of the officers and directors and department heads recently held at the Hotel Maryland at Milwaukee. Though the sales company is new it will market a series of trucks that is known in all parts of the country, and it has an organization of men selected because of their qualifications for the positions they hold, practically all having had experience with well established concerns.

Statement was made that the company would build six-cylinder trucks exclusively in two, three, four and five-ton sizes, equipped with electric lighting and starting systems. Contracts have been made for such parts as are made outside of the Stegeman plant in sufficient volume to insure continuous production of trucks in considerable numbers, and prompt deliveries can be made. The increased facilities of the factory will in-

son, director (general works manager Harley-Davidson Motor Co.); W. F. Port, purchasing agent; Faustin Prinz, director (president Prinz & Rau Co.), and E. M. McLean, director and sales manager.

During the dinner statement was made that the sales organization was being developed rapidly and the business already contracted for was extremely gratifying and encouraging.

G. A. Freeman, vice president of the J. C. Wilson Co., Detroit, has resigned and has joined the C. R. Wilson Body Co., which is making airplane bodies. Andrew Lehr, who was identified with the Studebaker and General Motors companies, has succeeded him.

Rollin W. Hutchinson, Jr., who resigned as sales manager of the Sterling Motor Truck Co., Milwaukee, Wis., nearly a year ago, has become general sales manager of the heavy duty division of the Vim Motor Truck Co., Philadelphia, Pa.

MAY SELL TRUCK PLANT.

There is probability that the plant and business of the Detroit-Wyandotte Motor Truck Co., Wyandotte, Mich., builder of Horner trucks, which is now in the hands of a receiver, may be purchased and the industry continued. The company has inventoried assets of approximately \$200,000, and liabilities of \$85,000, according to the receiver's statement, but because of the lack of sufficient capital continued operations were not believed judicious. The company is willing to sell the factory, stock and good will for a reasonable price.

F-W-D TRUCK PRODUCTION.

The Four Wheel Drive Auto Co., which has contract to build 3500 F-W-D trucks for the Quartermaster Department of the United States Army, is producing these at the rate of about 150 a week, and there is probability that this production will be considerably increased. Officers and men of the Ordnance Department, U. S. A., sent to Clintonville, Wis., to study the construction of the trucks are quartered in barracks erected near the plant. These men are changed as the periods of instruction terminate.

SHIPPING SPACE ECONOMY.

A 50 per cent. economy of shipping space has been obtained by the Federal Motor Truck Co., Detroit, in crating the class B army trucks it is building, these being so dismantled that when ready for shipment abroad practically but half that required for the trucks as formerly crated is necessary. This is a very material saving when the limited steamship freightage is considered and may be followed by other concerns.

TRUCK DEALERS ORGANIZED.

The Commercial Car Dealers' Association has been formed by about 40 different concerns at Cleveland, O., that deal in power trucks and conversion units, with H. L. Schnieder, manager for the Republic Motor Sales Co., president. A committee of five is to draft a constitution and formulate the general plan for organization and the activities of the association.

EXPANSION OF U. S. TRUCK WORKS.

A building of brick and steel, three stories, which will be used by testing, painting and final assembling departments, is now being erected at the plant of the United States Motor Truck Co. at Cincinnati, O. Another building that will be approximately three times the size of the unit specified is planned and will probably be built this year.

All tests of motor trucks for the Milltor Corps, Jersey City, N. J., are now in charge of Joseph W. Gardham, formerly technical representative for the Chalmers Motor Co.

ADDITIONS TO DENBY PLANT.

Extensive additions are now making to the plant of the Denby Motor Truck Co., Detroit, which are expected to be ready for use by May 1, which will so much increase the manufacturing facilities that production can be doubled. The average daily output is now 10 trucks and this will be made 20 or better when the buildings are completed and equipped. One of the structures will be steel and concrete and the others wood. The concrete building will be 140 by 175 feet and the wooden buildings somewhat smaller. All of these will be used for assembling machines. As approximately 75 per cent. of the material used is manufactured in Detroit, much of the production is dependent upon the concerns manufacturing parts.

TRUCK LOADS OF TRUCKS.

The Packard Motor Car Co., Detroit, has inaugurated a plan of shipping trains of trucks carrying trucks and cars over the highway from the factory to the Atlantic. The first of these to be sent away consisted of six twin six cars and 26 trucks, a total of 32, but by loading five of the cars and 10 of the trucks on the largest trucks the number of units was reduced to 17, one of the two trucks driven "single" carrying a load of parts. The train was taken overland by a crew of drivers sent from Philadelphia, the destination of the train, in charge of B. F. Leaman.

CONTRACTS FOR 4000 TRAILERS.

Contracts for 4000 trailer units have been made by the Quartermaster Corps of the United States War Department, and the construction of these will be hurried as rapidly as possible. Of these one for 1500 units is with the Dort Motor Car Co., Flint, Mich.; one for 1000 units with the Ohio Trailer Co., Cleveland, O., and one for 500 units each with the Columbia Truck and Trailer Co., Detroit; the Miami Trailer Co., Troy, O., and Rogers Brothers Co., Albion, Pa.

YALE TRAILER CO. ORGANIZED.

The Yale Trailer Co., Yale, Mich., has been organized with capital of \$10,000, with Rene V. Card, Detroit, president; Irving I. Card, Toledo, O., vice president, and Earl R. Card, Yale, secretary and treasurer. The manufacturing and sale departments will be directed by Irving and Earl Card, who will be the active officials of the company.

John S. Collins has resigned as sales manager for the Chevrolet Motor Co., Flint, Mich., and has been succeeded by R. J. McMullen, who was in charge of the sales organization of the company in Texas. J. W. Hawk, who was assistant to the sales manager of the New York City division, has taken up Mr. McMullen's work in the Southwest.

GENERAL MOTORS EARNINGS.

General Motors properties, according to the report of the General Motors Corporation which succeeded the General Motors Co., Aug. 1, 1917, during 1917 earned undivided profits of \$26,285,951, after charging off \$6,901,899 for war taxes and extraordinary expenditures, which is equal to about 34.2 per cent. on the \$76,873,300 General Motors common stock outstanding Dec. 31, 1917.

After allowing for the preferred stock dividend, as well as the war taxes, the undivided profits amounted to \$12,492,968 in the 11 months ending July 31, and to \$13,792,983 in the five months ending Dec. 31, 1917. The five months specified covers the period of the operations of the General Motors Corporation, and the first 11 months the operations of the General Motors Co.

WILL ENLARGE MOTOR WORKS.

Statement is made that the Continental Motors Corporation is to build a new drop forging plant outside of the city

BLOOD BROS. MACHINE CO.

One of the principal industries of Allegan, Mich., is Blood Bros. Machine Co., a concern that has constantly specialized the production of universal joints for use in constructing the power transmission systems of automobile cars and trucks. The company was established at Kalamazoo, Mich., where it operated for a number of years, but in January, 1915, it was removed to Allegan, where the factory building now occupied had been erected purposely for its purposes.

The company was incorporated in 1904 and it has developed steadily with the automobile industry, its products being recognized as standards by all designers and constructing engineers. The property owned covers 3 1/10 acres and on this is one building having floor area of 21,000 square feet. The factory is admirably equipped with machine tools and every facility for economical production and the convenience of the workers. The number of employees is 150. The capital invested in the company is \$170,000. The present officers of the company



The Plant of the Blood Bros. Machine Co., Manufacturer of Universal Joints, One of the Principal Industries of Allegan, Mich.

and a considerable distance from its Muskegon, Mich., factory, well removed from other structures. The vibrations from the heavy hammers of the shop now in use threaten to damage surrounding buildings to a material extent, which impels the removal. The plan of connecting the shop with the main works by an industrial railway has been evolved to convey materials and save time and labor.

The city of Halifax, N. S., has purchased a G. A. Schacht truck because of the uses made of a machine of this make during the time the city was making first recovery from the explosion that devastated it early in the winter.

Sales Manager Clare, Eastern Sales Manager Korshin and the New York City distributors of Atterbury trucks gave a dinner to about 40 Atterbury dealers at Silsbee's restaurant, Brooklyn, N. Y., March 8.

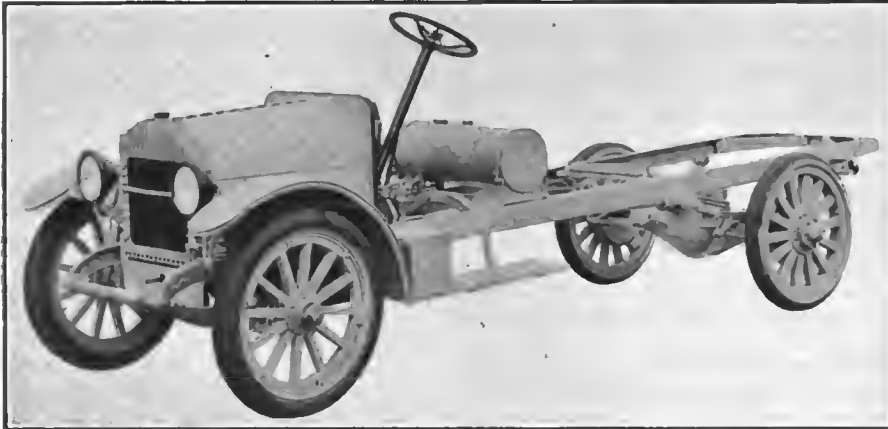
are: President, L. H. Mattingly; vice president, O. S. Cross; treasurer and secretary, B. G. Urch; directors, L. H. Mattingly, F. I. Chichester, O. S. Cross, C. E. Carson and L. L. Thompson.

NO TRUCK TAX IN FRANCE.

Motor trucks are specifically exempted from taxation in a bill enacted by the French government that imposes a tax of 10 per cent. on the purchase price of many products, although certain types of motor vehicles are included. This is distinctly a war measure and will probably be modified later on.

Maj. Charles S. Dahlquist, formerly engineer for the Timken-Detroit Axle Co., is in charge of the inspection of axle production for the Motor Transport Division of the Quartermaster Corps, U. S. A. He was recently promoted to his present rank from a captaincy.

FIRST COMET TRUCK A ONE-TONNER



Comet One-Ton Truck Worm-Driven Chassis Without the Driver's Seat, but Otherwise Practically Complete.

WITH the intention of manufacturing in considerable volume the Comet Automobile Co., Decatur, Ill., has begun commercial production of a one-ton truck chassis, and the purpose is to increase this as rapidly as is practical. The company has built passenger cars for several years and has a well equipped factory and excellent facilities for manufacture, and because of the demand for freight carrying machines it purposes to produce these to meet whatever demand may be experienced.

The ton chassis is the first of a series that will be built practically to a single design, the principal difference in construction being in dimensions of parts. The load capacities of the larger trucks have not as yet been decided, but these will be to conventional ratings. All of the trucks will be worm driven and will have four-cylinder engines. The ton chassis is equipped with electric lighting and starting systems, and this equipment may be installed on the other machines, although no definite statement has been made with reference to this.

The ton chassis has wheelbase of 130 inches and it is designed with the driver's seat behind the engine, there be-

ing 102 inches of the frame behind the driver's seat or cab available for body installation without overhanging the frame. The body, if intended for light bulky loads, can be considerably longer by extending the sills and building the frame slightly heavier.

Has Unit Power Plant.

The power plant is a unit type that includes a four-cylinder, four-cycle, water cooled, L head, vertical engine, having cylinder bore of 3¼ inches and stroke of five inches, and a rating by the S. A. E. formula of 16.90 horsepower, but this is considerably exceeded when driven to maximum capacity. The engine cylinders are cast en bloc with detachable water jacket head, this insuring ample chambers and free circulation of the water. The valves are at the right side and are completely enclosed by cover plates and protected from abrasives.

The engine is lubricated by a combination pressure and splash system that is claimed to be very efficient. It is cooled by a thermo-syphon circulation of water through the jackets of the cylinders and a large radiator. The radiator is constructed with ample cast top and bottom tanks, the top being finned to ob-

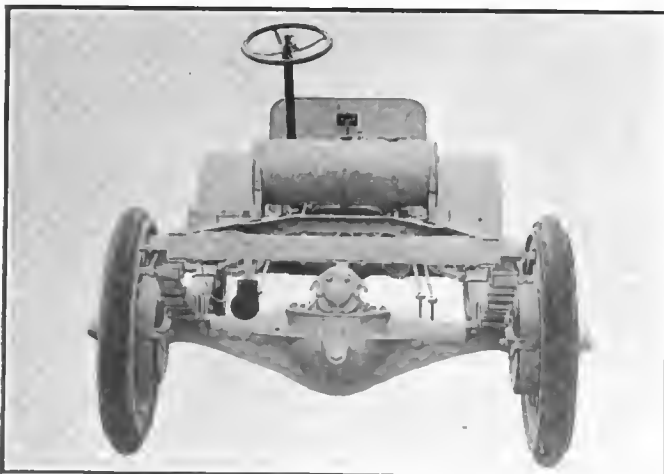
tain greater radiation. The cooling section is a honeycomb core that can be easily removed for repair in the event of damage. The air circulation is afforded by a large fan mounted on annular ball bearings on an adjustable bracket carried on the forward end of the cylinder block, that is driven by a flat belt from a pulley on an extension of a shaft from the timing gearset.

The fuel is supplied from a cylindrical tank under the driver's seat through an automatic float feed type carburetor, and the source of ignition current is a Dyneto generator with a Delco distributor and coil used with an 80 ampere-hour storage battery. The engine is also fitted with a Dyneto starting motor, having a Bendix drive pinion meshing with teeth cut in the periphery of the flywheel.

The Power Transmission System.

The clutch is a Borg & Beck dry multiple disc type, with 10-inch discs, that is fully enclosed and requires practically no attention aside from bearing lubrication, and is very accessible and dependable for all kinds of heavy service. The transmission gearset is a selective type, designed for truck construction, having three forward speed ratios and reverse, with heavy shafts and gears with wide faces. This is mounted as a unit with the engine and clutch, the entire assembly being suspended at three points and fully protected from the stresses of chassis distortion.

From the engine the drive is by a large tubular shaft with universal joints at either end, to the Wisconsin worm driven rear axle. The axle housing is malleable iron and the casting is heavily webbed to afford strength, the main web extending the entire length of the axle from brake flange to brake flange. The central section or bowl is also reinforced by horizontal webs against transverse stresses. The axle is fitted with annular ball radial and thrust bearings of ample proportions of capacity much in excess of the loads that must be carried.



The Rear End Construction of the Comet One-Ton Chassis, Showing the Wisconsin Worm-Drive Axle.



The Forward End of the Comet One-Ton Chassis with the Hood Removed to Show the Power Plant Details.

Other Chassis Details.

The front axle is a heavy drop forged steel I section that is specially designed for truck construction. The frame is pressed steel channel section of unusual strength and wide webs, that is strongly gusseted and reinforced, with heavy cross members. This is carried on long semi-elliptic springs of special alloy steel, having large bolts and shackles. The bolts are hardened and ground and the shackles and spring eyes are fitted with oilers that insure sufficient lubrication. The torque and driving thrust are taken by the rear springs, no radius rods or torque arm being provided.

The wheels are wood, artillery type, the forward set having 12 spokes and the rear set 14 spokes, which are shod with solid band tires, 34 by four inches, but the buyer can have pneumatic equipment should this be desired. The control is conventional, the clutch and service brake being operated by foot pedals with hand throttle and ignition levers on the steering wheel, and the gear shifting and emergency brake levers mounted in a tower on top of the transmission gearset housing in the centre of the footboard. The service brake is an external contracting type, the shoes clamping on drums on the rear wheels and the emergency brake shoes are internal expanding within the same drums. The steering gear is a Lavine construction, a worm and sectional nut type, located at the left side of the chassis, having an 18-inch hand wheel.

The truck is well built, careful provision being made to obtain endurance, all the bearing surfaces in moving contact being large, and means are provided for insuring positive lubrication for all wearing parts.

The Comet company has just completed a new factory building that has been equipped with the latest and most economical machine tools and other facilities for production, and a considerable output of machines is insured from exceedingly advantageous material contracts recently entered into.

NEW STEWART TRUCK PRICES.

New prices for all sizes of Stewart trucks have been fixed by the Stewart Motor Corporation, Buffalo, N. Y. The prices of the 1500-pound, 2000-pound and 4000-pound trucks have been increased \$100 each to \$850, \$1395 and \$2295 respectively, and the 3000-pound truck price has been increased \$55 to \$1750. These prices are for chassis only.

BIGGAM TRAILER CONTRACT.

Contract has been made by the Biggam Trailer Corporation, Corunna, Mich., to build trailer units for the service of the United States Signal Corp to the value of \$200,000, which must be completed in seven months. There is probability of the company receiving a second contract to the amount of \$600,000.

ROVAN TRUCKS TESTED.

Rovan four-wheel driven trucks have been extensively tested at Marfa, Tex., the chassis having four-cylinder engines, with cylinder bore of $4\frac{1}{2}$ inches and stroke of six inches and load capacity of three tons. On the chassis were bodies 14 feet long and seven feet wide. The truck tried for long hauls was driven 17 different trips to military camps along the Mexican border, a total distance of about 2000 miles, traversing all kinds of country and very poor roads, and climbing rough grades having as high as 37 per cent. ascent. The truck was built by a number of manufacturers of construction units, one of those principally interested being the Adams Axle Co. of Findlay, O. Observers detailed by the War Department closely followed the tests and will make full reports of the results.

JANUARY TRUCK EXPORTS.

During January the foreign shipments of power trucks totaled 1156, which was a gain of 231 as compared with December when 825 machines were exported. There was a shrinkage of 184 when contrasted with January of last year, when 1340 trucks were sent abroad, but this was previous to the declaration of war against Germany by the United States and there was not the domestic demand that now exists.

Of the 1156 622 went to France, 237 to the United Kingdom and 87 to Canada. The valuation of the shipments was \$3,328,870, against \$1,585,481 for December, 1917, and \$3,818,210 for January of last year. All but 28 per cent. of the shipments were made from New York City.

FRUEHAUF CAPITAL INCREASE.

The capital of the Fruehauf Trailer Co., Detroit, manufacturer of semi-trailer units, having load capacities from one to 10 tons, has been increased to \$150,000. The sales organization of the company is now being expanded and the larger resources will afford much greater production. The following officers have been elected: President and treasurer, A. C. Fruehauf; vice president and general manager, Harvey C. Fruehauf; secretary and general manager, E. L. Vosler.

A four-story building of reinforced concrete, with brick walls, is being built at the plant of the Buda Co., Harvey, Ill., which will be largely used for assembling and testing engines. This will considerably increase the capacity of the works.

The American Motor Truck Co., Newark, O., has absorbed the Blair Motor Truck Co. of that city and it will continue the manufacture of the Blair series of trucks under the same name and to the same design.

HURLBURT DEVELOPMENT.

The production plans of the Hurlburt Motor Truck Co., New York City, purpose the construction of 1800 trucks of different sizes the present year, practically all of which are to be marketed in the country for the company has finished its orders for delivery to foreign governments and for export. Until within a very short time about all the machines built were sent overseas, but now the company has begun the development of a sales organization in this country that will be increased as rapidly as conditions justify.

The company was established a little more than four years ago with \$12,000 capital, and President W. B. Hurlburt proposed to develop eventually a large concern that would produce trucks of known quality and in sizes to meet practically all requirements. The company was recently refinanced and the contracts now existing, which must be completed this year, will net a profit of slightly more than \$1,000,000, after setting aside a reserve fund of \$150,000.

The plant of the company is located on the Harlem river at Third avenue, so that there are unusual rail and water facilities for receiving materials and for shipping machines, a condition that insures better deliveries than can be made by other concerns, especially with reference to the eastern section of the country.

SHAW CORP. TO BUILD TRUCKS.

The Walden W. Shaw Corporation, Chicago, has begun the delivery of truck chassis to local purchasers and agents and the expectation is to produce three sizes of machines in considerable numbers. The trucks will be 1500 pounds, 3000-pounds and 5000-pounds load capacities, and the two smaller chassis will be sold for \$1100 and \$2050 respectively. The trucks will be conventional in design and will have Continental engines. The Shaw Corporation has for a considerable period operated taxicabs in Chicago and as a matter of economy built its own machines. The work shop has been expanded to factory proportions and equipped for truck construction on a considerable scale.

TRAFFIC TWO-TON TRUCKS.

With \$500,000 capital the Traffic Motor Truck Corporation has been organized at St. Louis, Mo., with H. P. Mammern, who was associated with the Westcott Motor Car Co., as president, T. C. Brandle as vice president and Guy Wilson as secretary and treasurer. The company purposes to build a two-ton truck chassis that will be sold for \$1095. Plans for production are being developed and a sales organization is being created.

The capital of the Acason Motor Truck Co., Detroit, Mich., has been increased from \$50,000 to \$200,000 to meet the demands for increased production.

OPEN ROADS WITH TRUCK SNOW PLOWS



Snow Plow Specially Designed for Truck Propulsion, Used by State of Connecticut, Breaking the Boston Post Road Between Bridgeport and New Haven.

THE State of Connecticut has been a leader in the work of mobilizing its resources for the successful prosecution of America's part in the war. In many fields it has been a pioneer, until today Connecticut's example is watched for with interest, and followed by those who are in charge of the war work in other states.

One particular field in which this state has led most of the others is in the organization of its highways transportation system. As everyone knows she has for years been building up an excellent net work of state roads. This with other subsidiary and feed roads cover the state completely and bind together her numerous munition producing cities with their markets and shipping points along the Atlantic coast.

New England is served by one great railroad system. Until the European war broke out this railroad was sufficient. But with the war orders from abroad the output of the shops and mills and factories increased almost overnight to many times the normal amount and the railroad began to be smothered. The tie up of freight at terminals, caused by the lack of ships, added to the shippers' troubles. It was at this time of freight embargoes that the motor truck first came into its own as a practical agent for moving of freight. There are many factories in the New England states that were able to keep open at that time only because they could bring in over the highways the raw materials that were necessary for them.

The crisis of the pre-war traffic congestion passed. For a time the conditions became almost normal and the railroad was able to hold its own against the manufacturers. But New England had learned her lesson and had come to realize the strategic importance of her highways. And so when the United States entered the war and the railroad again became swamped with more raw material and finished product than it

could handle, Connecticut was ready. The state Council of Defense suggested legislation that has made of these highways arteries of commerce of the highest value, as a complement to the system of rail transportation. Laws have also been passed that have maintained the roads of the state at the highest efficiency despite a winter of unprecedented vigor.

The Council of Defense realized that the motor truck was the solution of the problem, and while practically every one else was spending their time talking about the possibilities of the motor truck they took steps to utilize it as such. The return system of truck transportation was instituted. By this system a Connecticut truck nowadays runs loaded both going and returning. This has been achieved by systematization of intercity trucks, by bureaus established in the large cities of the state, under the auspices of the local Chamber of Commerce of War Bureaus. These bureaus

keep on file a list of motor trucks available for local or intercity transportation. The shipper has only to consult one of these lists to obtain a return load for his truck. In this way the usual efficiency of the motor truck is increased 100 per cent.

The law requiring the Highway Commission to keep the state roads open at all times of the year has had the result of making possible shipments over the road of numerous supplies for our own and allied governments that could not possibly have been sent out by rail under the conditions existing this winter. It is of the greatest national importance that the great munition centre of America never lacks transportation facilities.

One of the most important stretches of highway is the Boston post road, running from New York through Bridgeport and New Haven. This stretch of road is under the care of R. M. Donnelly, commissioner of repairs. How well he has done his work may be known from the fact that despite heavy snow falls of December and January the state road has been continuously open full width for every kind of service up to the heaviest hauling. Mr. Donnelly's supervision extends over 75 miles of state highway. The cleaning of such a stretch between sunset and sunrise is a big man's job.

To do this work of clearing Mr. Donnelly uses four motor trucks, which are equipped with adjustable snow plows. The two larger of these trucks are built in Bridgeport. The plow blades are of steel and are 10 feet long and 14 inches wide. They are hung on a semi-circular steel frame, which is operated from the seat of the truck by a hand wheel and heavy chains. With this arrangement it is possible to set the scraper blade to either a right or left hand angle, so the snow can be plowed either toward the centre of the street or toward the gutter. There is an automatic blade release so constructed that when the cutting



View of the Plow, Which Has a Scraper Blade 10 Feet Long, That Is Raised and Lowered by Chain Hoist Operated by a Hand Wheel from the Seat.

edge strikes an obstacle such as a man-hole cover or car track the blade releases to pass over the obstacle and then immediately returns to its operating position.

In clearing the highways in the country two trucks are used in tandem formation and about a block apart to obviate the danger of absolutely blocking all traffic behind. The truck in the rear follows to the right or left of the forward truck, catching up the snow in its wake and throwing it and the snow untouched by the first truck, further to the side of the road. After the heaviest snow storm these trucks cover a minimum of 30 miles in a working day, clearing the road for a width of 18 feet and averaging from three to three and a half miles on a gallon of gasoline.

It has been proven that this method of clearing the state highways is a complete success and that it is the cheapest method yet discovered of dealing with the snow problem. It is predicted that in the near future many cities will use this method also. New York city has over 300 plows, but has to hire trucks to use with them. Philadelphia is better equipped, owing both to plows and trucks, and is not faced with the necessity of putting its snow clearing work out at contract. The great Lincoln highway, from Cleveland east, has been kept open this winter by the use of the same plow. It has been found that the larger trucks of high power are by far the most efficient in this work.

It is surprising to learn what a large effect the hills have on the cost of this work. Near the city of Bridgeport, where the country is flat and hills are few, the cost is \$7.50 per mile. When operating on the hills in and near Greenwich the cost is between \$30 and \$40 per mile.

It is merely a question of how long it will be before the other states realize the national importance of their roads and follow Connecticut's lead in keeping them open to all sorts of weather. The railroad of the nation cannot handle the traffic that war makes necessary. The motor truck must do its share. In order that it may do it most efficiently the roads of the nation must be kept all ways in the best possible condition.

A commission as captain in the Officers' Reserve Corps, Motor Equipment Division, Quartermaster's Department, U. S. A., has been received by William W. Hodge of Hodge Bros., Worcester, Mass., dealer in Commerce and Kelly-Springfield trucks.

Having been commissioned a major in the United States Signal Corps, Clinton E. Amorous, for years associated with the Locomobile Co. of America at Bridgeport, Conn., has left the employ of the company to enter active service.

The plant of the Mutual Motors Co., Jackson, Mich., will be operated as a shell manufactory beginning about April 1 and it will employ approximately 1000 men in all departments. The building has been leased for three years.

HUDSON BRIDGE AND TUNNEL.

The New Jersey Bridge and Tunnel Commission, which has been created to serve with a similar commission representing New York state in planning and constructing bridges, or tunnels, or both, between Manhattan Island of New York City and Jersey City, Hoboken or Weehawken in New Jersey, has been organized with Walter H. Noyes chairman, Samuel T. French vice chairman and Palmer Campbell temporary secretary.

These officers are constituted an executive committee that will prepare a definite plan which will be presented to the New York commission, and eventually agreement will be reached as to joint action by the commissions. The main object is to obtain direct communication from one side of the Hudson river to the other by vehicles through one or more tunnels, or across one or more bridges. Ferries are now the only means of crossing the river, and there is great delay through river congestion or

REAL HAULAGE ECONOMIES.

One of the large industries of Meriden, Conn., is the Charles Parker, manufacturer of metal specialties, which produces lamps of all types, hardware, household accessories and furniture in large volume. The factories employ a very large number of skilled workers, and while the tonnage of manufactured products is not large the value gained through manufacture is an unusually large percentage.

This company uses two Federal trucks in its haulage service both of these being 3½-ton machines. These are utilized for hauling metal of all kinds, coal and other manufacturing necessities and the products as they are shipped from the plant. One of the trucks in nine months hauled 6199 tons of freight at a net cost of 33 cents a ton, which is exceedingly low freightage when the value is considered. The other Federal truck in one month carrying finished products hauled 189 tons, making 571 miles and



Two Federal Trucks Operated by the Charles Parker Co., Art Metal Manufacturing Specialist, Meriden, Conn., with Large Economy in Short Hauls.

weather conditions, aside from other causes.

BUYING ARMY TRUCKS ABROAD.

Though no statement directly concerning the subject has been made authoritatively, there is current belief in England that the United States has placed orders with a number of English firms to supply trucks to the American army in France, because of the inability to obtain all the machines required from the United States as rapidly as they are needed for military operations.

The branch of the Polack Tire and Rubber Co. at 140 Dover street, Boston, is now in charge of A. S. Holley as New England manager. He was formerly connected with the Packard Motor Car Co. of Boston as a sales representative.

The distribution of Amesbury conversion units, an internal gear driven unit, built at Amesbury, Mass., has been undertaken in New England by A. H. Sowers of Boston, who is also New England agent for Fulton trucks.

135 trips, which demonstrates the short haulage of the hauls and the bulky character of the loads.

The company has found the machines exceedingly satisfactory from all points of view, utilizing them to the exclusion of other equipment.

The three upper floors of a building to be erected at Walnut avenue and East 11th streets, Cleveland, O., has been leased by the Standard Parts Co. of that city. It will be known as the Standard Parts Building, will be 99 by 123 feet and will cost about \$300,000.

The exclusive service agency for the Holley Kerosene Carburetor for Detroit has been acquired by the Motor Mart of that city, which anticipates affording this service without charge to more than 7000 owners of Ford cars in that city and vicinity.

The J. E. Bolles Iron and Wire Works, maker of parts for motor truck construction, some of which are used in building Liberty trucks for army service, is now in a new plant at 288 Milwaukee avenue, East, Detroit.

CONTRACTS MADE FOR ARMY TRUCKS

Four Concerns Will Build 10,650, and Two of These and 12 Others Will Assemble 10,000 More, a Total of 20,560 Machines

CONTRACTS made under the direction of the Motors Division of the Quartermaster's Department at Washington have been announced, covering the production of 10,650 truck chassis and trucks, of which the Garford Motor Truck Co., Lima, O., will build 900 chassis; the Locomobile Co. of America, Bridgeport, Conn., 1650 chassis; the Pierce-Arrow Motor Truck Co., Buffalo, 2300 1½-ton trucks and 1000 five-ton trucks; the Packard Motor Car Co., Detroit, 4800 two-ton trucks.

The Harley-Davidson Motor Co., Milwaukee, will build 8125 motorcycles and the Hendee Manufacturing Co., Springfield, Mass., 5500 motorcycles, a total of 13,625 machines.

Contracts for truck bodies call for 24,100 class B (three-ton rating) bodies and for 2575 class A (1½-ton rating) bodies, a total of 26,675 bodies of both types. These are scattered with 11 different concerns, the largest contract being for 9000 units, made with the International Harvester Co., Chicago.

In addition to these contract has been made with the following

LIST OF CONTRACTS UNDER DIRECTION OF THE MOTORS DIVISION.

Name and Location	Quantity	Item
Garford Motor Truck Co., Lima, O.....	900	Chassis
Locomobile Co. of America, Bridgeport	1,650	Chassis
Pierce-Arrow Motor Car Co., Buffalo..	2,300 1½-ton trucks	
	1,000	5-ton trucks
Packard Motor Car Co., Detroit.....	4,800	3-ton trucks
Harley-Davidson Motor Co., Milwaukee	8,125	Motorcycles
Hendee Mfg. Co., Springfield, Mass....	5,500	Motorcycles
Mulholland Co., Dunkirk, N. Y.....	500	Truck bodies, Type A
Hercules Buggy Co., Evanston, Ind...	400	Truck bodies, Type A
International Harvester Co., Chicago...	1,000	Truck bodies, Type A
Theodor Kundtz Co., Cleveland.....	550	Truck bodies, Type A
Grand Rapids School Equipment Co., Grand Rapids.....	6,400	Truck bodies, Type B
Continental Car Co., Louisville, Ky....	2,000	Truck bodies, Type B
Eagle Iron Works, Auburn, N. Y.....	1,200	Truck bodies, Type B
International Harvester Co., Chicago...	9,000	Truck bodies, Type B
Edw. G. Budd Mfg. Co., Philadelphia...	5,000	Truck bodies, Type B (steel)
J. G. Brill Co., Philadelphia.....	300	Truck bodies, Type B
	125	Truck bodies, Type A
Hopkins Mfg. Co., Hanover, Pa.....	200	Truck bodies, Type B

PARTS AND ASSEMBLIES, CLASS B, STANDARD MOTOR TRUCKS.

Continental Motors Corp., Detroit....	6,400	Motors
Wisconsin Motor Co., Milwaukee.....	1,000	Motors
Waukesha Motor Co., Waukesha.....	2,000	Motors
Hinkley Motor Corp., Detroit.....	1,200	Motors
Timken-Detroit Axle Co., Detroit.....	5,000	Sets axles
The Sheldon Axle Co., Wilkesbarre...	2,500	Sets axles
American Ball Bearing Co., Cleveland..	2,000	Sets axles
Covert Gear Co., Lockport, N. Y.....	5,000	Transmissions
Warner Gear Co., Muncie, Ind.....	4,000	Transmissions
T. W. Warner Co., Muncie, Ind.....	2,000	Transmissions
Muncie Gear Co., Muncie, Ind.....	1,000	Transmissions
Covert Gear Co., Lockport, N. Y.....	4,000	Clutches
Warner Gear Co., Muncie, Ind.....	4,000	Clutches
Detroit Gear & Machine Co., Detroit..	4,000	Clutches
Covert Gear Co., Lockport, N. Y.....	5,000	Controls
Warner Gear Co., Muncie, Ind.....	6,000	Controls
Dayton Engineering Laboratories Co., Dayton	10,000	Generators
Bijur Motor Lighting Co., Hoboken...	2,000	Generators
Eisemann Magneto Co., Brooklyn, N. Y.	5,000	Magnetos
Splitdorf Electrical Co., Newark.....	3,000	Magnetos
Ericsson Mfg. Co., Buffalo.....	2,000	Magnetos
Remy Electric Division, United Motors Corp., Anderson.....	12,000	Distributors and coils
Kellogg Switchboard & Supply Co., Chicago, Ill.....	12,000	Switches
Splitdorf Electrical Co., Newark.....	500	Magnetos
C. A. S. Products Co., Columbus.....	2,500	Steering gears
Warner Gear Co., Muncie, Ind.....	3,000	Steering gears
Ross Gear & Tool Co., Lafayette, Ind.	1,000	Steering gears
Gemmer Mfg. Co., Detroit.....	5,000	Steering gears
Fedders Mfg. Co., Buffalo.....	2,000	Radiators
McCord Mfg. Co., Detroit.....	2,000	Radiators
National Can Co., Detroit.....	1,000	Radiators
Perfex Radiator Co., Racine.....	1,000	Radiators
Long Mfg. Co., Detroit.....	4,000	Radiators
English & Hersick Co., New Haven...	1,000	Radiators

companies for complete assemblies of trucks, the government to supply the parts, the rating of the machines being for class B only. The number awarded each contractor was as follows: Gramm-Bernstein Motor Truck Co., Lima, O., 1000; Kelly-Springfield Motor Truck Co., Springfield, O., 500; Indiana Truck Corporation, Marion, Ind., 500; Service Motor Truck Co., Wabash, Ind., 500; Republic Motor Truck Co., Alma, Mich., 1000; Pierce-Arrow Motor Car Co., Buffalo, 1000; Selden Truck Sales Co., Rochester, N. Y., 1000; Bethlehem Motors Corporation, Allentown, Pa., 700; Diamond T Motor Car Co., Chicago, Ill., 650; United States Motor Truck Co., Cincinnati, O., 500; Brockway Motor Truck Co., Cortland, N. Y., 650; Velie Motors Corporation, Moline, Ill., 500; Sterling Motor Truck Co., Milwaukee, 500; Garford Motor Truck Co., Lima, O., 1000; a total of 10,000.

The complete list of the contractors of all descriptions and the character of the contract in connection with the assembly of 10,000 trucks is as follows:

G. & O. Mfg. Co., New Haven.....	1,000	Radiators
Rome-Turney Radiator Co., Rome, N. Y.	1,000	Radiators
Savage Arms Corp., Sharon, Pa.....	2,500	Frames
A. O. Smith Corp., Milwaukee.....	2,000	Frames
The Hydraulic Pressed Steel Co., Cleveland	2,000	Frames
Detroit Pressed Steel Co., Detroit....	2,000	Frames
Parish & Bingham Co., Cleveland....	2,000	Frames
Detroit Steel Products Co., Detroit...	4,000	Springs (front)
	4,000	Springs (rear)
Standard Parts Co., Cleveland.....	8,000	Springs (front)
	6,000	Springs (rear)
The Mather Spring Co., Toledo.....	6,000	Springs (front)
	6,000	Springs (rear)
Sheldon Axle & Spring Co., Wilkesbarre	4,000	Springs (front)
	4,000	Springs (rear)
The Cleveland Canton Spring Co., Canton, O.....	4,000	Springs (front)
	4,000	Springs (rear)
Schwarz Wheel Co., Philadelphia.....	500	Sets wheels
Hayes Motor Truck Wheel Co., St. Johns, Mich.....	2,700	Sets wheels
Standard Wheel Co., Terre Haute, Ind.	300	Sets wheels
The Auto Wheel Co., Lansing.....	500	Sets wheels
Prudden Wheel Co., Lansing.....	250	Sets wheels
Dayton Steel Foundry Co., Dayton....	1,250	Sets steel wheels (40 x 10)
Michigan Malleable Iron Co., Detroit..	750	Sets steel wheels (40 x 10)
Standard Steel Castings Co., Cleveland	2,000	Sets steel wheels (40 x 10)
Dayton Steel Foundry Co., Dayton...	1,000	Sets steel wheels (40 x 12)
Michigan Malleable Iron Co., Detroit..	250	Sets steel wheels (40 x 12)
Standard Steel Castings Co., Cleveland	1,500	Sets steel wheels (40 x 12)
Otis Elevator Co., New York, N. Y....	150	Sets steel wheels (40 x 10)
	100	Sets steel wheels (40 x 10)
Prudden Wheel Co., Lansing.....	500	Sets wood wheels
Bimel Spoke & Auto Wheel Co., Portland, Ind.....	500	Sets wood wheels
Hayes Mfg. Co., Detroit.....	8,000	Seat assemblies
C. R. Wilson Body Co., Detroit.....	3,000	Seat assemblies
Michigan Stamping Co., Detroit.....	8,000	Dashes
International Metal Stamping Co., Detroit	3,000	Dashes
International Metal Stamping Co.....	5,000	Hoods
Hayes Mfg. Co., Detroit.....	6,000	Hoods
	11,000	Fenders (pairs)
	5,000	Fan shrouds
Michigan Stamping Co., Detroit.....	6,000	Fan shrouds
Geuder, Paeschke & Frey, Milwaukee.	5,500	Feed tanks
	5,500	Reserve tanks
Kardell Bros. Co., Utica, N. Y.....	5,000	Feed tanks
	5,000	Reserve tanks
Hartford Auto Parts Co., Hartford....	2,000	Universal joints, rear
Kinsler-Bennett Co., Hartford.....	2,000	Universal joints, front
Peters Machine & Mfg. Co., Cleveland	2,500	Universal joint assemblies
Spicer Mfg. Corp., Plainfield.....	4,000	Universal joint assemblies
Universal Machine Co., Bowling Green, O.....	3,500	Universal joint assemblies

Philadelphia Storage Battery Co., Philadelphi	2,000 Batteries	National Machine Products Co., Detroit	5,500 Sets rear spr. shack. sub.-assem.
Stollite Co., Indianapolis.....	3,000 Batteries	E. A. Laboratories, Inc., New York..	12,000 Warning signals
S. Light & Heat Corp., Washington	2,500 Batteries	General Motors Corp., Flint.....	5,500 Transm. frt. hangers
Sta Accumulator Co., Chicago.....	2,000 Batteries	Standard Parts Co., Cleveland.....	5,500 Transm. frt. hangers
lity Battery Co., Chicago.....	1,000 Batteries	General Motors Corp., Flint.....	11,000 Spr. shac. forgings
llard Storage Battery Co., Cleveland	2,500 Batteries	Standard Parts Co., Cleveland.....	11,000 Spr. shac. forgings
roft Battery Co., Detroit.....	1,000 Batteries	General Motors Corp., Flint.....	5,500 Engine supports
de Motor Lamp Mfg. Co., Cleveland	2,500 Sets lamps	Standard Parts Co., Cleveland.....	5,500 Engine supports
nunds & Jones Corp., Detroit.....	3,000 Sets lamps	Massnick Mfg. Co., Detroit.....	6,000 Steering gear frame brackets
M. Hall Lamp Co., Kenosha.....	4,500 Sets lamps		6,000 Steering gear frame brack. caps
iana Lamp Co., Connersville, Ind..	1,500 Sets lamps		6,000 Intermed. brake shaft brack.
bee Wire & Iron Works, Lafay-		Standard Parts Co., Cleveland.....	5,000 Intermed. brake shaft brackets
tte, Ind.....	3,000 Radiator guards	National Machine Products Co., Detroit	5,000 Steering gear frame brackets
Yalo Pitts Co., Buffalo.....	2,000 Radiator guards		5,000 Steering gear frame brack. caps
wart Iron Works Co., Cincinnati..	2,000 Radiator guards	Union Forging Co., Union, N. Y.....	40,000 Minor parts
r Pressed Steel Co., Lansing.....	3,000 Radiator guards	Sterling Mtr. Truck Co., Milwaukee..	103,000 Minor parts
r Dorn Iron Works, Cleveland.....	2,000 Radiator guards		24,000 Minor parts
higan Stamping Co., Detroit.....	6,000 Dust pans	Indiana Mtr. Truck Co., Marion, Ind..	147,000 Minor parts
N. Murray Mfg. Co., Detroit.....	5,000 Dust pans	Gramm-Bernstein Mtr. Truck Co., Lima	257,000 Minor parts
W. Johns-Manville Co., New York..	2,000 Odometers	Cleveland Hardware Co., Cleveland...	82,000 Minor parts
wart-Warner Speedometer Corp.,		Standard Parts Co., Cleveland.....	520,000 Minor parts
hicago.....	10,000 Odometers	Stewart Iron Works, Cincinnati.....	110,000 Minor parts
eppe & Wilt Mfg. Co., Detroit....	3,000 Reach rods	Gramm-Bernstein Motor Truck Co.,	5 Complete assem. minor parts
higan Plant Steel Products Co., De-	5,000 Reach rods	Lima, O.....	515 Minor parts
roft.....		Empire Brass Mfg. Co., Cleveland....	6,000 Gas reserve tank drain cocks
incinnati Ball Crank Co., Oakley, Cin-	2,500 Reach rods	Metal Forming Corp., Elkhart, Ind....	5,000 Exhaust pipes
roft.....	2,500 Sprag assemblies	Standard Brass Works, Detroit, Mich.	5,000 gas reserve tank drain cocks
eppe & Wilt Mfg. Co., Detroit....	2,500 Sprag assemblies		11,000 Radiator drain cocks
r Pressed Steel Co., Lansing.....	2,500 Sprag assemblies	Cook Spring Co., New York, N. Y.....	11,000 Springs, brass wire
roft Pressed Steel Co., Detroit....	2,500 Sprag assemblies	Eurton Lowery Co., Detroit.....	4,000 Sets upholstery
wart Iron Works, Cincinnati.....	3,000 Sprag assemblies	J. C. Wilson Co., Detroit.....	3,000 Sets upholstery
mpson Mfg. Co., Des Moines.....	3,500 Sprag assemblies	Briggs Mfg. Co., Detroit.....	2,000 Sets upholstery
higan Plant Steel Products Co., De-		American Auto Trimming Co., Detroit	2,000 Sets upholstery
roft, Mich.....	7,000 Crank assemblies	Walker Mfg. Co., Racine, Wis.....	4,000 Sets Jacks
omberg Motor Devices Co., Chicago	1,250 Carburetors	Keeler Brass Co., Grand Rapids, Mich.	500 Sets brass hood fast. iron
nth Carburetor Co., Detroit.....	1,250 Carburetors		4,500 Sets hood fast. mall. iron
omberg Motor, Chicago.....	8,300 Carburetors	Columbus Auto Parts Co., Grand Rapids	3,000 sets hood fast., steel
higan Stamping Co., Detroit.....	6,000 Bumpers	Hancock Mfg. Co., Charlotte, Mich....	3,000 sets hood fast., steel
isbury Wheel and Axle Co., James-	5,000 Bumpers	Hughes & Curren Co., Rochester.....	3,000 cape tops
own, N. Y.....		Briggs Mfg. Co., Detroit.....	3,000 cape tops
amm-Bernstein Motor Truck Co.,	1,000 Assemblies	Anchor Top and Body Co., Cincinnati	3,000 cape tops
Lima, O.....	500 Assemblies	American Auto Trimming Co., Detroit	3,000 cape tops
ly-Springfield Motor Truck Co.,	500 Assemblies	Gramm-Bernstein Motor Truck Co.,	250 Sets spark and throt. control assem.
Springfield, O.....	500 Assemblies	Lima.....	5,000 Sets spark and throt. control assem.
iana Truck Corp., Marion, Ind....	500 Assemblies	Standard Parts Co., Cleveland.....	6,000 Sets spark and throt. control assem.
vice Mtr. Truck Co., Wabash, Ind.	1,000 Assemblies	National Machine Products Co., De-	6,000 Gas. feed pipe shut-off cocks
ublic Mtr. Truck Co., Alma, Mich.	1,000 Assemblies	troit.....	5,000 Gas. feed pipe shut-off cocks
erce-Arrow Mtr. Car Co., Buffalo...	1,000 Assemblies	American Brass and Iron Co., Detroit.	4,500 Sets wiring assem.
iden Truck Sales Co., Rochester...	700 Assemblies		4,500 Sets wiring assem.
thlehem Motors Corp., Allentown..	500 Assemblies	Fackard Electric Co., Warren, O.....	2,000 Sets wiring assem.
amond T. Motor Car Co., Chicago...	150 Assemblies	Remy Electric Division United Motors	11,000 Funnels
		Corp., Anderson, Ind.....	11,000 Light bulbs, cases
ited States Motor Truck Co., Cin-	500 Assemblies	Barcy Nicholson Co., Detroit.....	10,000 Water cans
nnati.....	500 Assemblies	Dover Stamping & Mfg. Co., Cambridge	10,000 Fan belts
ockway Motor Truck Co., Cortland,	150 Assemblies	Gray & Davis, Inc., Boston.....	
N. Y.....	500 Assemblies	National Can Co., Detroit.....	
le Motors Corp., Moline.....	1,000 Assemblies	Chicago Raw Hide Mfg. Co., Chicago..	
rling Mtr. Truck Co., Milwaukee..	3,000 Mufflers	Graton & Knight Mfg. Co., Worcester,	
rford Mtr. Truck Co., Lima, O.....	3,000 Mufflers	Mass.....	
lberg Mfg. Co., Detroit.....	3,000 Mufflers	Crowe Name Plate & Engraving Co.,	
higan Stamp. Co., Detroit.....	5,000 Draw bar assemblies	Philadelphia.....	
eco Mfg. Co., Detroit.....	3,000 Draw bar assemblies	Champion Ignition Co., Flint.....	
rdell Brothers Co., Utica.....	8,000 Rear spring shackle pins	Vicheck Tool Co., Cleveland, O.....	
ndard Parts Co., Cleveland.....	8,000 Rear spring frt. brack. pins		
age Arms Corp., Sharon, Pa.....	24,000 Frt. spr. hangers and shackle bolts		
isbury Wheel and Axle Co., Inc.,	8,000 Engine support bolts (front)		
amestown, N. Y.....	22,000 Engine support bolts (rear)		
el Products Co., Cleveland.....	7,000 Rear spr. shackle pins		
	7,000 Rear spr. frt. brack. pins		
own Co., Syracuse.....	21,000 Frt. spr. hangers and shack. bolts		
	9,000 Frt. spr. hangers and shack. bolts		
	7,000 Engine support bolts		
	7,000 Brake equal. lever pins		
	5,000 Rear spr. shackle bars		
higan Screw Co., Lansing, Mich...	15,000 Brake equal. lever pins		
	7,000 Spring shackle pins 7414-V		
	7,000 Rear spr. frt. brack. pins		
	7,000 Engine support bolts		
umbia Axle Co., Cleveland.....	6,000 Rear spr. shackle bars		
ndard Parts Co., Cleveland.....	5,500 Sets rear spr. shack. sub.-assem.		
		Standard Parts Co., Cleveland, O.....	6,000 Gas. feed pipe, sub-assemblies
		Imperial Brass Co., Chicago, Ill.....	5,000 Gas feed pipe, sub-assemblies
		Cook Spring Co., New York, N. Y....	11,000 Radiator foot bolt springs
			11,000 Brake rod springs
			11,000 Sets tool bag equip.
			11,000 Wrenches, brake adj.
			3,000 Wrenches, worm
			6,000 Wrenches, tappet
			3,000 Valve lifters
			3,000 Wrenches, spr. clip, open end, 1 in.
			3,000 Wrenches, spr. clip, open end, ¾ in.
			3,000 Handles, pipe, galv., 16 in. long
			3,000 Gauges, valve tappet, etc.
			6,000 Gas. feed pipe, sub-assemblies
			5,000 Gas feed pipe, sub-assemblies
			11,000 Radiator foot bolt springs
			11,000 Brake rod springs
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			6,000 Wrenches, tappet
			3,000 Valve lifters
			3,000 Wrenches, spr. clip, open end, 1 in.
			3,000 Wrenches, spr. clip, open end, ¾ in.
			3,000 Handles, pipe, galv., 16 in. long
			3,000 Gauges, valve tappet, etc.
			6,000 Gas. feed pipe, sub-assemblies
			5,000 Gas feed pipe, sub-assemblies
			11,000 Radiator foot bolt springs
			11,000 Brake rod springs
			11,000 Sets tool bag equip.
			11,000 Wrenches, brake adj.
			3,000 Wrenches, worm
			6,000 Wrenches, tappet
			3,000 Valve lifters
			3,000 Wrenches, spr. clip, open end, 1 in.
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			3,000 Wrenches, spr. clip, open end, ¾ in.
			3,000 Handles, pipe, galv., 16 in. long
			3,0

Maryland Wants Trucks Taxed to Repair Roads

All the highway traffic from the North into Washington specifically and into Virginia in general crosses or passes over the highways of Maryland. Since the declaration of war the population of the capital has increased enormously, and because of railroad congestion shipments have been made by motor truck to that city and to the Virginian seaports. The highways of Maryland have been subjected to wear just as roads elsewhere in the country have been worn where the traffic has increased.

The intensely patriotic (?) politicians of Maryland, who ought to understand quite as well as any other citizens the vital necessity of road freightage, have regarded the wear of the roads, and statement can be made here that the highways are not well built, as an opportunity to play politics. First they want the national government to pay a part of the cost of the repair of these thoroughfares, and then they propose to double the tax on all power trucks, this being preliminary to the announced purpose of again doubling the tax in 1920.

The fact that the state is a beneficiary of the nation in the \$85,000,000 that is

of truck owners of the state is decidedly in opposition, but they are a very small minority. They logically state that if they are taxed for wear of the roads all other users ought to be taxed as well.

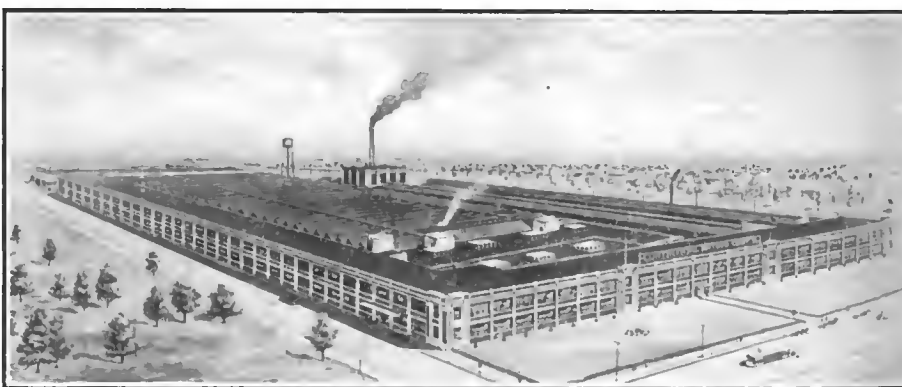
The asininity of the proposal can be judged by business men who must have transportation. If they are willing to endure animal vehicles they can escape taxation. If they regard economy, and in the final analysis the cost of haulage of any kind is paid by the people, they can either go into politics and make a contest on the basis of reason, or contest the law on the basis of unconstitutionality, or "pass the buck" and let those who support such a measure politically pay the price.

There is much apprehension felt by those who are interested in furthering highway transportation that other states

CONTINENTAL MOTORS CORP.

The Continental Motors Corporation, with executive offices at Detroit and plants at Detroit and Muskegon, Mich., claims the distinction of being the largest exclusive manufacturer of engines for automobile trucks and cars in the world. The progression of the company is remarkable in many ways. It was established in 1902 at Muskegon, where business was carried on for several years, the demand for the engines necessitating constant expansion of the plant.

Later on the need of representation in Detroit justified the location of the sales department in that city, and then came the construction of another factory in Detroit. Since then the growth of the company has been extremely rapid. The company has 1,000,000 square feet of land



The Plants of the Continental Motors Corporation, the Largest Manufacturer of Internal Combustion Engines in the World: Above, the Detroit Works; Below, the Muskegon, Mich., Factory.

to be expended in Federal aid to the states is overlooked entirely. All the wildly enthusiastic patriots of Maryland now exact from the owner of a five-ton truck is \$342 a year, or \$68.40 a ton, and if the bill now before the Legislature becomes law this will be increased to \$682, which will be equivalent to \$163.80 a ton. Not only this, the state officials do not hesitate to state that two years hence, when the Legislature shall meet again, the purpose is to increase the tax to \$1364, or \$272.80 a ton.

The statement is made in justification of the proposition that motor trucks cause wear to the amount of \$300 a mile annually to the highways, and that the vehicles that pass over them must be made to pay for the wear. The attitude

will regard the attitude of Maryland as justifying legislation that will increase the taxes for licensing power trucks. The supposition of all politicians apparently is that the owners of trucks and cars must pay heavily for the use of roads, but owners of other vehicles can wear the highways to any degree without being taxed. They invariably seem to believe that when a road has been constructed it ought to endure without wear.

As the Maryland law now stands there is a tax of \$342 a year, which means a tax of \$1.14 for each of 300 working days of the year, and if the proposed amendment is enacted the tax will be \$2.28 a day. Should the plan of the politicians be carried out the tax would be \$1.56 a day in 1920.

in its factory sites, and on these are splendid manufacturing buildings, constructed with regard for every essential to progressive industry and the welfare of the workers. The equipment of the plants is the best obtainable, with reference to economies of time and labor and every facility for expediting production has been provided. Statement is made that during the past two years the area of the factories has been increased 100 per cent., which is the best demonstration of the development of the company.

The company builds nothing but four and six-cylinder engines, these being designed for both car and truck service, producing these in very large numbers. Besides its regular contracts the company is now producing a considerable proportion of the parts necessary for the construction of the trucks contracted for the service of the United States army. The capital invested is \$18,000,000. The officers of the company are: President, B. F. Tobin; vice presidents, H. J. Warner and R. W. Judson; treasurer, A. H. Zimmerman; secretary, W. E. Angell; sales manager, J. G. Painter. The accompanying illustrations demonstrate more clearly than description the magnitude of the plants and the operations of the concerns. Incidentally, both of these factories are operated at top speed to maintain the desired production.

E. S. Roberts has resigned as sales manager for the truck tire department of the McGraw Tire and Rubber Co., Cleveland, O. He was formerly manager of truck tire sales for the Kelly-Springfield Tire Co.

RUSSEL MOTOR AXLE CO.

One of the best known concerns of the automotive industry is the Russel Motor Axle Co., North Detroit, Mich., which was established in 1909, and incorporated Dec. 9, 1909. As the name implies the company was originally founded to manufacture rear axles and jackshafts for pleasure cars, and with keen realization of the possibilities of the use of power vehicles for freighting a series of axles for truck construction were produced. Careful engineering research convinced the officials of the company that the types of axles first built could be materially improved and various experiments were carried on to determine what would be the most practical to develop and manufacture.

The internal gear driven axle was regarded as that on which the company should concentrate, and a design was adopted that has been consistently produced in various sizes. A great deal of endeavor was devoted to promotion and when a demand was established this increased very rapidly. Today the company is one of the largest in America producing internal gear axles, and these are used by some of the best known truck builders, for Russel axles are recognized as standard construction units, both reference to efficient and quality.

The company now owns a site of 5½ acres on which are four factory buildings having 75,000 square feet of floor space. These are equipped with every facility for labor and time economy and for producing accurate work. The methods and processes have been developed through years of experience and the Russel axles are maintained to be exceptionally high grade. The company now employs 375 workers and the value of its finished production is approximately \$2,000,000. The company recently completed an addition to its plant having 30,000 square feet of manufacturing space, which increased the capacity about 40 per cent.

The officers of the company are: President, A. W. Russel; vice president, W. S. Russel; treasurer-secretary, George B. Russel; sales manager and advertising manager, A. C. Chambers; directors, A. W. Russel, W. S. Russel, George B. Russel, E. H. Jenks, B. H. Lawson and William Livingston.

Classes in truck salesmanship, which are held twice a week and are open to all who desire to obtain knowledge of this work, are taught in a school organized by the Harry Newman-Stratton Co., Chicago, distributor of Maxwell trucks. Men who are graduated and who have the desired qualifications can obtain employment with the company.

A branch office of the National Automobile Dealers' Association has been established at St. Louis, Mo., in charge of G. Elmo Holke, which is in connection with the office of President F. W. A. Vesper. The office of Secretary Bart J. Ruddle is continued at Milwaukee, Wis.

1918 I. H. C. ALMANAC ISSUED.

The 1918 International Harvester Almanac, published by the International Harvester Co. of America, is being mailed to 2,500,000 farmers in the United States and Canadian edition of 260,000 is being sent to farmers living in the Dominion.

The book this year is more of an encyclopedia than an almanac. There are a few pages devoted to astronomical calculations, the area and depth of oceans, and such things, but for the most part it is replete with facts practically of benefit to the farmer. Such questions as how to figure the speeds of belts, how to make war bread, how to can by the cold pack method, how to find the horsepower of a tractor, how to select lubricating oil, how to figure the draft of plows or draw bar pull of tractors and how to grind valves are answered.

More than 150 subjects are discussed briefly and to the point. The cover of the almanac is printed in five colors and shows a delightful scene from a modern farm.

NEW BODY BUILDING PLANT.

A building at 452 Franklin street, Detroit, has been leased by the Commercial Motor Body Corporation of New York City for three years, which will use this as a distributing plant in Michigan. The structure is 200 by 200 feet square, and three stories. A part of the structure will be equipped for body building and the remainder given over to storage of stock.

Because of the necessity of quick delivery 30 Master trucks were driven over the highway from Chicago to Pittsburgh, this being the first shipment from a point as far West as Chicago.

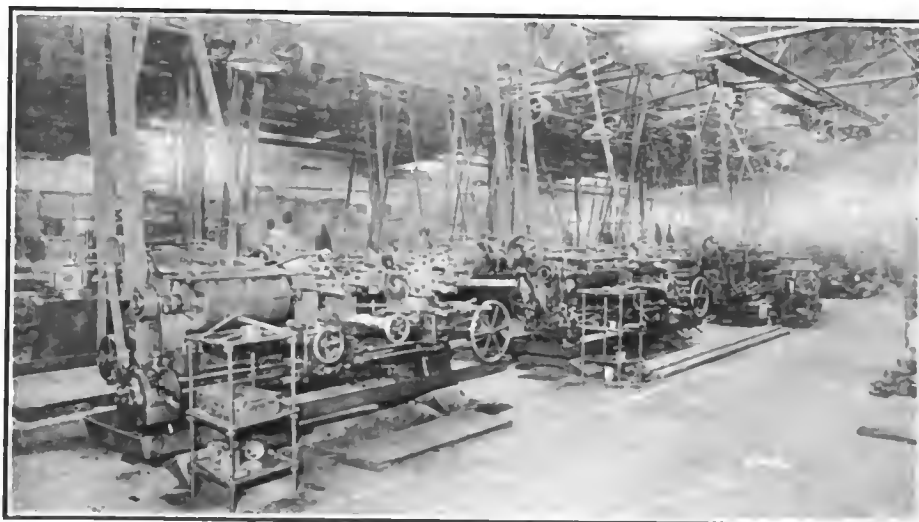
The eight-story branch building of the Ford Motor Co. at Washington, D. C., has been given over by the company to the government and is now occupied by the Quartermaster Corps.

Copland Represents Parts Industry at Capital

The Motor and Accessory Manufacturers' Association, Inc., at its monthly meeting March 15 voted to have A. W. Copland continue as its representative at Washington, this action being necessary because of the withdrawal of the National Automobile Chamber of Commerce of its representation by Hugh Chalmers in the War Industries Committee, and the retirement of John R. Lee of the Ford Motor Co., to take up active work at the Ford plant at River Rouge, Mich.

As the representative of the association Mr. Copland will continue the work that he was engaged in as a member of the Automobile Industries Committee, and as he has an increasing knowledge of the requirements of the government and of the resources of the industry, he can without doubt be of great value to both the association and to the nation. As he can devote himself unreservedly to the demands made upon him, Mr. Copland will be a potent factor so far as the interests of the manufacturers are concerned. At the meeting at which the association voted to concur in the division of the National Automobile Chamber of Commerce for separate representation, letters of appreciation of the services of Messrs. Chalmers and Lee were directed to the chamber and to the Ford Motor Co., and the action of the association was sufficient expression of satisfaction obtaining with Mr. Copland's endeavors.

Incidentally, the association heard the report of the alien labor committee, which had been prepared by Albert Champlon, W. C. Rands and George Edmunds, and this was regarded of so much importance that it was referred to the meeting of the board of directors in April.



A Section of the Machine Department of the Russel Motor Axle Co.'s Factory, North Detroit, Showing Part of a Big Battery of Warner-Swasey Lathes.

Flanged-Wheel Trucks in Railroad Work

Necessity has impelled the Selden Truck Sales Co., Rochester, N. Y., to utilize trucks for purposes for which they were not designed, and yet the results have been so satisfactory that seemingly large possibilities obtain so far as making up for the shortage of railroad locomotives. This does not mean that trucks can be used to haul trains long distances, but handling cars in railroad yards and drawing several cars over tracks where there will not be conflict of schedules appear to be exceedingly practical.

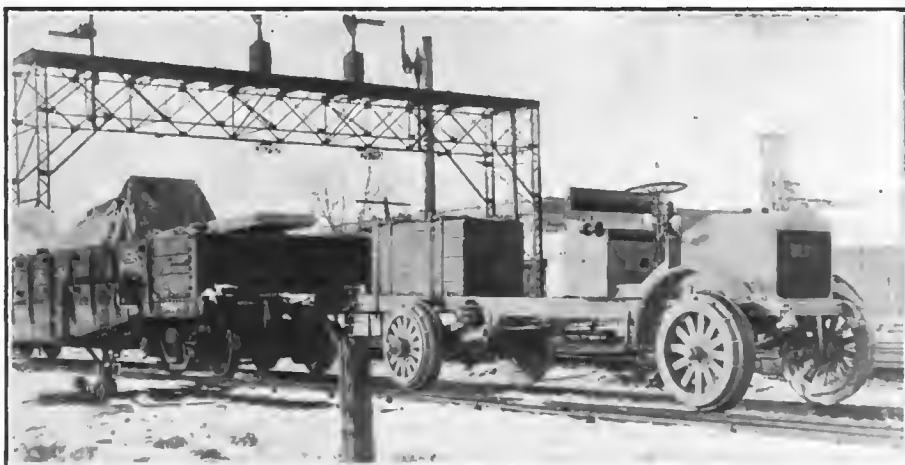
The Selden company's plant is reached by a spur track from the New York Central railroad, and cars taken to the factory for loading are ordinarily hauled to the main yard and there "made

tracks between Rochester and Syracuse, to haul cars over its tracks with the flanged-wheeled truck.

The exhibition trucks were placed in two regular freight cars and these were switched on to the electric railroad. The Selden truck was manned with a driver and a Rochester, Syracuse and Eastern conductor and was given a schedule that was coincident with the regular operations of the road. The train was driven to Syracuse, a distance of 75 miles, and the trucks were delivered in time for the show. Later on the exhibit was returned in the same manner. This practical use of machines appears to offer large possibilities where there is available trackage and cars and a shortage of locomotives, for the cost of conversion is comparatively small.

CANTONMENT 'BUS SERVICE.

The Columbus-Camp Sherman Transit Co. has been incorporated at Columbus, O., by Frank H. Field, John A. Poland, B. M. Hetrick, F. E. Field and L. D. Hetrick, with capital of \$10,000, to operate a



Selden Truck, Equipped with Flanged Wheels, Used for Switching Railroad Cars and Hauling Small Trains on Electric Roads.

up" into trains according to the destination. This work is done with small switching engines, which are not powerful enough to do train haulage. During the past winter, however, because of the very heavy traffic and the need of using all the locomotives obtainable for road work, there has been a shortage of "switchers." This shortage was especially acute at Rochester, and as there was a prospect of cars being held at the plant for considerable periods the company was forced to provide equipment for hauling the cars to the main yard.

A model NL chassis was equipped with flanged wheels so that it could be driven on the standard gauge railroad track, and this was used to haul empty cars to the factory and loaded cars to the yard. The work was done well and quickly, and with such a degree of satisfaction that when the railroad could not insure the delivery of cars laden with trucks for exhibition at the Syracuse automobile show the company undertook to do the haulage itself. Arrangement was made with the Rochester, Syracuse and Eastern railroad, an electric line, with

passenger service between the Union station at Columbus and the Red Cross community house at Camp Sherman. The service was begun March 15 with White 22-passenger 'buses, the machines leaving at intervals of three hours and making the trip one way in two and a half hours.

BIG BASE TRUCK REPAIR SHOP.

A truck repair shop that will have capacity for overhauling 1200 trucks a month, or approximately 24,000 machines a year, is comprehended in the plan for an ordnance base in France that will cost \$25,000,000 as projected. The purpose is to have all repairs of major character done at this shop. The base will require 450 officers and 16,000 men when in full operation.

With headquarters at Kansas City, Mo., J. Weich, who was associated with the Interstate Automobile Co., Muncie, Ind., is now western representative for the Fruehauf Trailer Co. of Detroit.

U. S. TRUCK PRICES ADVANCED.

After April 15 the prices of United States trucks will be from \$150 to \$300 more than prior to that date. The price for model E, 2½-ton chain driven, and model D, 3½-ton chain driven, will be increased to \$2800 and \$3500 respectively, or advances of \$150 each. The price for model H, 2½-ton worm driven, model J, 3½-ton worm driven, and model K, 5-ton worm driven, will be \$3250, \$3950 and \$4850 in the order of capacity given, these being advances of \$300 each.

PITTSBURGH TRUCK SHOW.

A show of motor trucks that will be organized by the Automobile Dealers' Association of that city will take place at the Motor Square Garden at Pittsburgh, Pa., beginning April 8 and continuing to April 13. The exceptional demand for machines and the intense interest of business men in all phases of transportation has impelled the show. This condition, so far as need of transport equipment is concerned, has been manifested all over the country.

WILL BUILD STEAM TRUCKS.

A series of trucks having load capacities from three to 10 tons will be built by the Steam Auto Co., Denver, Col., which has been organized by William H. Ingraham, president; J. B. Stokesbury, vice president and general manager; C. C. McFee, secretary, and N. E. Jackson, treasurer. The capital of the company is \$200,000 and the trade name of the machines will be Steam-O-Truck. Production will be begun on a five-ton machine.

NEW SERVICE DISTRIBUTORS.

Contracts have been made with the following to be distributors of Service trucks, built by the Service Motor Truck Co., Wabash, Ind.: E. L. Peacock Auto Co., Oakland and San Francisco, Cal.; Service Motors Co., Wichita, Kan.; Southern Garage Co., Birmingham, Ala.; Crawford-Jenkins-Booth Co., Shreveport, La.; Lon-Claffin Co., Salt Lake City, Utah; Samuel Earley Motor Car Co., Philadelphia, Pa.

The Naval Stores Co., New Orleans, La., and the Lind-Knapp Co., San Francisco, Cal., have been appointed distributors of F-W-D trucks, the former for Southern Mississippi and Louisiana, and the latter for Northern California, Southern Oregon and Western Nevada.

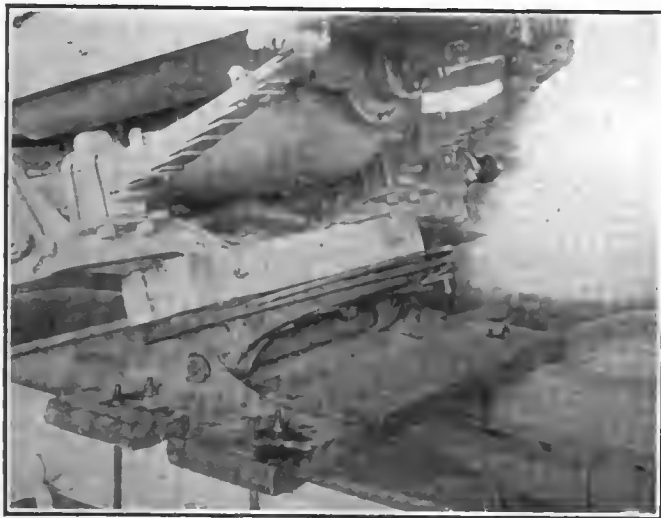
Having large contracts for United States government work, the Winther Motor Truck Co., Winthrop Harbor, Ill., is to erect a plant at Kenosha, Wis., which will cost about \$125,000 and will be completed about May 15.

Plans have been made to greatly increase the production of the Holley Kerosene Carburetor Co., Detroit, probably by 100 per cent. by July 1.

Truck Hauls Chassis as Semi-Trailer

Practical Method for Handling Two Machines of Same Size

The conditions that must be met by truck manufacturers to make distribution of trucks to dealers, especially those



Martin Fifth Wheel as Adapted for Coupling a Truck or Chassis as a Semi-Trailer.

doing business considerable distances away, are little realized by those who have merely superficial knowledge of railroad congestion and transportation limitations. Unless trucks can be delivered they cannot be sold, and business men are not inclined to wait for indefinite periods, no matter how much they may desire a particular make of machine. When railroad cars are unobtainable the next resort is "driveaways," which is practical within reasonable distances. The cost is dependent upon the condition of the highways, the time and the expense for fuel, meals, lodgings, etc., and viewed from any aspect the expense is large, at least much larger than the usual charges for freight.

Besides this there is the wear of the machine to be considered, and there is reasonable objection by most buyers to marring, which may be such that refinishing is essential. This, of course, is another item that adds to the cost, and as this is usually borne by the purchaser the desire of the agent is to minimize all expenditures.

With a view of minimizing expense so far as possible the Columbia Truck and Trailer Co., Detroit, has devised a method of driving trucks overland that may be stated to be an adaptation of the trailer idea if the machines are approximately equal in size. When machines are of such sizes that one can be loaded on the other, and there are facilities for hoisting, by the use of special equipment the larger can carry the smaller, but this

is not practical if the two are the same capacity for instance. The Columbia method is to equip one machine with a Martin rocking fifth wheel as a tractor, and by removing the front wheels of the other and attaching the semi-trailer part of the fifth wheel to the front axle, to fit it for coupling as is a semi-trailer by elevating the forward end of the chassis.

The practicality of the Martin fifth wheel for this use is demonstrated by the accompanying illustrations. When the second truck transmission gearset lever has been placed in neutral it can be drawn along with very little additional power and it can be easily controlled.

The one illustration shows the two trucks coupled and the other a close view of the fifth wheel, which can be tipped to any angle necessary for coupling, this depending upon the length of wheelbase.

The method has been proven to be not only economical, but absolutely successful, and, of course, the equipment can be utilized as frequently as desired, being changed to other chassis as required. The trucks shown in the illustration were

driven from Pontiac, Mich., to Louisville, Ky., on country roads during a very bad blizzard, reaching the destination in three and a half days. Previous to this manner of shipping a car load of trucks sent by freight from Pontiac to Louisville were on the road more than a month. The saving in time was very important to the buyers, and the shipping of two trucks at a time is a decided economy.

C. S. Harper, formerly manager at San Francisco, Cal., for the Willard Storage Battery Co., has been transferred to the management of the company's branch station located at Seattle, Washington.



Columbia Truck with Temporary Equipment for Hauling Trucks or Chassis as Semi-Trailers in Long Distance Drives from Factories.

Drive Trucks 1170 Miles Overland

Five five-ton GMC trucks, each of which carried a 1500-pound truck, reached Boston, March 19, having been driven 1170 miles in 14 days, starting from the factory at Pontiac, Mich. This was the third trip of the kind made by the men and the experience of previous drives was invaluable to them.

Because of the heavy snow between Buffalo and Springfield, Mass., although army truck trains have been driven between Buffalo and Albany, the route selected was largely over the Lincoln Highway and the Boston Post Road via Detroit, Toledo, O., Cleveland, O., Beaver Falls, Pittsburgh, Gettysburg and Philadelphia, Pa.; New York, New Haven and Hartford, Conn.; Springfield and Worcester, Mass. This added upward of 250 miles to the itinerary, which would have been about 825 miles if by way of Buffalo and across the Berkshire Hills.

The train was driven through heavy rain four days, snow three days and two days of zero weather. The first day but eight miles were made, and three days were required to cover 18 miles between Unity, O., and Beaver Falls, Pa. But the 175 miles between Trenton, N. J., and New Haven, Conn., was driven in one day.

INDEPENDENT TRUCK PLANT.

Statement is made that the Independent Truck Co., Port Huron, Mich., has bought a property at Youngstown, O., on which it will erect factory buildings, and when these shall be completed and equipped, about May 15, the intention is to remove to Youngstown. The company has capital of \$300,000 and the new plant will have capacity for producing about 250 trucks annually.

Clarence S. Walker, for seven years assistant examiner in the United States patent office at Washington previous to becoming patent counsel for the Packard Motor Car Co., Detroit, has resigned to associate himself with the Wire Wheel Corporation, Buffalo, N. Y., in a similar capacity.

Truck Big Economy For Uncle Sam

Saving in Cost of Haulage and Handling a Large Amount Daily

Outside of the executives of the War and Navy departments of the government no one has accurate knowledge of the number of men who may be said to be under arms, and whose food must be provided for by the commissary department, or what corresponds to it. In all of the cantonments and various camps and garrisons throughout the nation the soldiers are furnished three meals daily, and the same statement may be made with reference to all naval stations and ports where vessels are stationed. There are numerous places where men are trained for both branches of the service, and there are still other camps and fields where the aviation corps are trained until they are fitted for duty abroad.

Besides these, of course, hundreds of thousands are engaged in work for the government, but this may be either in clerical or industrial labor where the usual home routine is practically continued. No one, probably, really knows even an approximate total of the number of men and women who are contributing directly so that the war may be carried on.

Food is an absolute essential. Without food the army and navy could not be trained, and statement is made by a source that is regarded as authoritative that four pounds of food is required daily by every soldier serving in the United States army. Presumably an equal amount is needed by every man in naval service. Something like 4,000,000 pounds of food a day, or 2000 tons, is required to ration the soldiers alone, of which 1,200,000 pounds is beef, 70,000 pounds is coffee, and so on through the different items.

The food must be supplied regularly

and to schedule, and it is transported from the warehouses by contractors and thence distributed to the camps, stations, garrisons and cantonments. This work is done very generally with power trucks, and the total number in use in all parts of the country is surprisingly large. The supplies are sometimes carried considerable distances. The accompanying illustration shows several of the fleet of Federal trucks operated by C. E. Card, produce dealer at Chattanooga, Tenn., which are being loaded to haul food to the army post at Chickamauga Park, 12 miles distant. These trucks make from one to three trips daily, usually two when the weather is good, and most of the time the loads are considerably in excess of capacity to meet the demand, which, of course, varies considerably. Incidentally, this condition is experienced in many parts of the country.

EXCHANGED AUTO SHOW.

A department for trucks will be one of the features of the second annual show of exchanged automobile vehicles, which will be held at the Coliseum at Chicago, March 30-April 7, for which more than 80 exhibition spaces have already been sold. The main building and annex will be used for show purposes, the trucks and conversion units being in the annex. The purpose is to have the vehicles offered for sale inspected and appraised before being shown, the valuations being established by impartial judges. As the machines are sold they will be removed from the show and others brought in to fill the spaces.

NEW G-B-S HEAVY DUTY ENGINE.

An engine for heavy duty—for trucks and tractors—has been designed for Golden, Beiknap & Swartz Co., Detroit, Mich., and production will shortly be begun. The engine will have four cylinders, which will be cast singly and the valves will be the overhead type. The lubrication system will be full pressure.

Because of limited space the truck department planned for the Peoria, Ill., automobile show was abandoned.

Farm to New York Parcel Post Delivery

An experiment of parcel post service was made March 20 under the direction of Fourth Assistant Postmaster-General James I. Blakslee when an Autocar truck used in Baltimore was assigned to make a trip from Lancaster to New York City. It was driven by S. B. McNeil, a resident of Oxford, Md., temporarily serving the government.

The truck was a regular type used for parcel post collection and it was freighted with 50 crates of eggs, 1000 day-old chicks in crates, butter and honey. The truck was started from Lancaster at 4:15 in the morning and at 4:17 in the afternoon it reached the 33rd street branch of the New York City postoffice, making the 180 miles in 12 hours and two minutes and immediately after arrival delivery was begun, this being completed shortly after 5 o'clock. The truck carried besides its freight 1920 pounds of mail and the checker. The truck consumed 20 gallons of gasoline making the trip, an average of nine miles to the gallon.

Lancaster is in Southeastern Pennsylvania and is the terminal of parcel post routes that carry farm products daily to Philadelphia and Baltimore, and the local postoffice is a store to which farmers send farm products for delivery by mail. The statement of Mr. Blakslee is that this trip was the first time in the history of the country that a shipment by freight, mail or express had been made direct the same day from producer to consumer over a distance of more than 100 miles.

Mr. Blakslee maintained that this experiment—and the running time of the truck for the 180 miles was 10 hours—proved that every producing town within a radius of 180 miles of a given commercial centre could be made a suburb in the sense of practical shipping. He believed that this demonstrated the possibilities of close contact of consumers of food with the producers. The Postoffice Department has proven by experiment in many sections of the country that a power truck could collect and deliver, including farm produce, from points 50 miles distant within a day of 12 hours. With a fleet of 1550 trucks this service could be given twice in 24 hours on the 156,000 miles of improved road in the United States.

Basing conclusion on an estimated cost of 20 cents a mile for each truck, the total annual expense would be \$19,531,200, and the earnings of each truck would reach \$70 a day, or a total of \$34,179,600 a year. This was on a basis of the present postage rates and the earnings of the 3000-pound trucks operated by the department. There is reason to believe that the experiment will impel the establishment of a number of routes in different sections of the country affording similar service.



Part of a Fleet of Federal Trucks Operated by C. E. Card, Chattanooga, Tenn., Used in Transporting Food Supplies to the Army Camp at Chickamauga Park.

NEW SANFORD DISTRIBUTORS.

The Sanford Motor Truck Co., Syracuse, N. Y., has announced the appointment of the following distributors for Sanford trucks: R. V. Jones, Postal building, Kansas City, Mo., for Kansas City and Oklahoma; Lawrence Motor Sales Corporation, 136 West 52nd street, New York City, City of New York; Foley Motor Car Co., Newark, N. J., State of New Jersey; L. S. Hall Rubber Co., 804 North Carlisle street, Philadelphia, Pa., Philadelphia; J. A. Morris, 100 Temple street, New Haven, Conn., State of Connecticut; Oswego County Auto Co., Oswego, N. Y., Oswego county, N. Y.; R. E. Lent, Ossining, N. Y., Westchester county, N. Y.; W. Cady Smith, 1210 State street, Schenectady, N. Y., Schenectady county, N. Y.

SELIGMAN LOAN EXTENDED.

The loan by J. and W. Seligman & Co. to the Smith Motor Truck Corporation, for \$785,000, has been extended for another year from the day of expiration in April. Statement is made that the loan is secured by finished products to the extent of \$470,000, while the balance is an ordinary loan. The company, which has contracts to build a series of trucks for the government, is directed by officers representing the chief creditors.

DUAL TIRES FOR ARMY TRUCKS.

A conference of tire manufacturers with the Motor Transport Division of the Quartermaster Corps, U. S. A., at Washington, recently was with reference to standardization of truck tires. One of the results was decision to use 40 by six-inch dual tires on the class B trucks instead of 40 by 10-inch single band tires, as was originally planned.

More than 300 employees of the Buick Motor Co., Flint, Mich., gave a dinner to 35 of their number who were to enter the service of the government in different capacities, and among the speakers were Walter P. Chrysler, president and general manager of the company; Charles S. Mott, vice president of the General Motors Corporation, and Melnor C. Day, acting managing director of the Flint Chamber of Commerce.

The new factory of the Winther Motor Truck Co., at Kenosha, Wis., which will be of steel, brick and concrete, will be 150 by 450 feet, and will be completed about May 15. The cost will be \$125,000. A large government contract for trucks necessitated the erection of the building. The company is now located at Winthrop Harbor, Wis., near Kenosha.

R. C. Bridge has been made district manager for the Willard Storage Battery Co., with headquarters at San Francisco, Cal., with office at 1380 Bush street.

MOTOR PRODUCTS FINANCES.

During the year ending Dec. 31, 1917, the earnings of the Motor Products Corporation, Detroit, were \$537,527.67, and of this \$233,333 has been paid in dividends. The annual sales were \$9,633,082, which was an increase of \$3,153,506, or 48.6 per cent., as compared with the previous year. The increase did not include war or government orders and was for a term in which the affairs of the corporation were consolidated by locating four of its subsidiaries in the former Lozier plant. From the earnings the Federal taxes, which will range between \$80,000 and \$100,000, must be paid. The company has contracts for government work that will total \$5,500,000 and orders for other work amounting to \$2,000,000 approximately.

TRUCK RELEASES LOCOMOTIVE.

A Federal motor truck is now used by the general storekeeper of the Boston & Albany railroad at Springfield, Mass., for transportation about the yard for which a locomotive and cars had been utilized for years. Besides releasing the engine the truck is saving \$75 a month that was paid for trucking, and has practically obviated the payment of demurrage charges by hauling freights promptly between the Springfield freight house and the storehouse at West Springfield.

WILL MODIFY HEADLIGHT LAW.

A bill that will meet the approval of the state and power vehicle owners, which was agreed upon at a conference of state officials and representatives of motoring organizations, is soon to be introduced into the New York Legislature. The bill is to be general in its provisions and will specify the type of headlight that will best serve drivers and others using the highways.

William P. Barnhart has been appointed assistant director of sales for the United States Motor Truck Co., Cincinnati, O., and will be located at Washington, D. C., where he will also handle the business interests of the Stewart Iron Works, which is operated by the same men who control the truck company.

J. A. Holihan, formerly assistant general manager for the Briscoe Manufacturing Co., later president and general manager of the Holihan Manufacturing Co. and then district sales manager for the Federal Motor Truck Co., Detroit, has been made general sales manager for the Standard Motor Truck Co. of that city.

The Hawkeye Truck Co., Sioux City, Ia., has purchased five acres of land at 28th street and Floyd River road in that city and plans to erect a steel and stucco building 75 by 300 feet, with floor space of 22,500 square feet. Later on an office building will be built.

TRUCKS FOR HOSPITAL WORK.

A train of three-ton Riker trucks was sent from the plant of the Locomobile Co. of America at Bridgeport, Conn., to Washington, D. C., the 16 machines being intended for the service of the government, which is erecting the Walter Reed Hospital at Tacoma Park. The drive of 283 miles was made easily in three days. The trucks were designed for special work and had special equipment. The Walter Reed Hospital is to be very largely for the reclamation of men who have been so disabled by wounds that they must be taught trades and occupations that they may be self-supporting and be independent of charity. When finished it will be the largest hospital of the kind in the world.

BIG PEERLESS PROFITS.

Exclusive of munition contracts the net sales of the Peerless Truck and Motor Corporation in 1917 was \$18,924,451, which was an increase of \$5,399,423 over the previous year. After deducting interest and reserve for depreciation, losses and taxes, the profits were \$1,065,869, which amounted to 10.6 per cent. on \$10,000,000 common stock, as against 13 per cent., or \$1,356,358 in 1916.

STROMBERG PROFITS.

The net profits of the Stromberg Motor Devices Co. for 1917 was \$318,819, from which must be deducted the war taxes. This was an earning of \$6.37 for each of the 50,000 shares of common stock outstanding, and a gain of 83 cents a share as compared with the earnings of 1916. The company can produce 35,000 carburetors monthly. More than 25,000 instruments must be made each month to Aug. 1 to meet unfilled orders.

"JOINT-DRIVE" MOTOR TRUCK.

James L. Bloom of Lock Haven, Pa., has been granted a patent for a "joint-drive" for four-wheel driven motor trucks, which is claimed to have an unusual value. Statement is made that when equipped with this device the truck is driven equally well either forward or backward, the driver merely changing seat and driving practically with the same degree of control in one direction as in another, always facing the path of the truck.

Gustavus Sickles has been appointed sales manager for the Sullivan Motor Truck Co., Rochester, N. Y., and his headquarters is at 52 Osborne Terrace, Newark, N. J.

The De Luxe Automobile Co., St. Louis, Mo., has been made agent for Bethlehem trucks for that city and vicinity.

The annual meeting of the Michigan State Good Roads Association will be held at Detroit in September.

QUICK-DISCHARGING COAL TRUCKS



Two-Ton GMC Truck with Power Elevating Body Adapted for Direct or Chute Discharge by Varying Angle and Height.

By Frank C. Perkins.

THERE has been great development recently of motor trucks for the coal trade. The two-ton coal truck with dumping mechanism is now being utilized to great advantage. The first illustration shows a small coal truck developed by the General Motors Truck Co., Pontiac, Mich., one of which is operated by the Massachusetts Wharf Coal Co. of Boston. It is of interest to note that many of the larger coal dealers have abandoned the horse and wagon delivery entirely and have materially increased both their margin of profit and gross sales by installing motor truck equipment. Probably in no other line of business have trucks displaced horses to greater advantage or shown such a high return for the money invested. They widen the delivery range, adding customers who otherwise could not be served profitably and in this way the yearly tonnage handled is greatly increased.

Small Trucks Profitable.

It has been demonstrated that deliveries are made in a fraction of the time previously required, as one truck can do the work of three teams, and at a lower delivery cost per ton. Then comes the greater service—in labor, as one man can do the work of three, and thus fewer men are employed. By installing motor service the coal man turns time into money—loss into profit, and puts his delivery system on a better, more efficient basis.

It is pointed out that the coal business demands trucks that are strong and that will carry the rated load with safety under all road conditions. They must stand the gaff of hard day in and day out use the year around, with the least possible loss of time due to lay ups. That modern motor trucks are equal to these requirements is shown in the great demand for them from the coal trade.

Many of the sales are to coal men who have learned by experience or observation the fallacy of expecting light weight trucks to do the work, and who realize that it pays in the long run to put into the truck those qualities which mean service and long life with reasonable upkeep.

G-M-C Two-Ton Coal Truck.

The two-ton coal truck built by the General Motors Truck Co., it is claimed, will mount any reasonable grade, make rapid trips and facilitate handling coal. This two-ton truck has a rear elevating body that is hoisted by power. When elevated the rear is then depressed and from this height the coal is passed along a chute a distance of from 18 to 25 feet. By this means the necessity of hand carrying the load in certain instances, with its resultant cost in time and money, is obviated. The coal can be passed

through the chute over fences and across lawns, alleys, sidewalks, etc. The driver can deliver his load and be back at the yard while the ordinary truck is still unloading.

It is stated that where complete elevation is not necessary the load may be handled conveniently through a door at the bottom of the body where the chute is attached. This is used when it is possible to dump directly into a coal hole. It is still more convenient where it is necessary to carry the coal in baskets. For in the latter instance the flow of coal can be controlled by a slide door, enabling the driver to fill his baskets without great effort and without spilling the coal. The power hoist is operated by the driver from his seat, and its cost is saved many times over in its greater speed of operation, its efficiency and its saving of the time of the driver. One of the highest advantages of this light truck is that it may be driven where many heavier trucks cannot be used. With its comparatively light loads it can be depended upon to mount unusual grades and to overcome obstacles of weather and roads. This truck has a very low cost per ton mile with minimum depreciation and small upkeep cost.

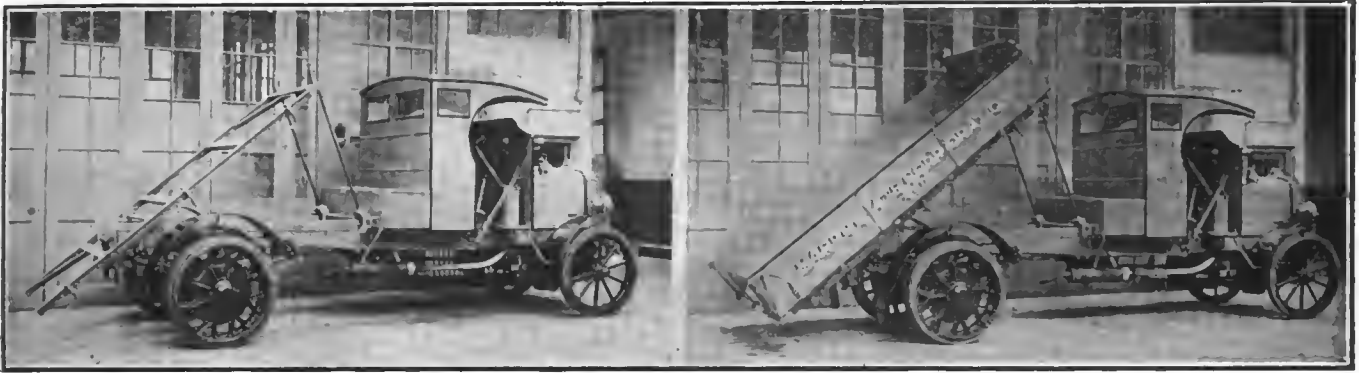
Can Carry Divided Loads.

It may be mentioned that the chute is carried beneath the body and does not have to be removed when dumping, unless desired. A swinging hoard has been placed in the centre of the body so the load may be divided into two deliveries: One ton delivered at one place, the other at another. To the experienced dealer, especially the retailer who sells in small lots, the saving of this latter feature is readily apparent.

The construction of the body and hoist is of special interest. The power hoist is operated by the driver from his seat by throwing the power take-off in or out of gear by lever. The rear end eleva-



A Six-Ton Front-Driven Couple-Gear Truck Equipped with Electric Hoist Operated from the Seat of the Driver.



Two Purpose Three-Ton English Daimler Truck: At Left the Elevating Frame That Carries a Dumping Body; at Right, the Dump Body Installed, That Can Be Replaced with a Water Tank.

tion is three feet and body is tilted 30 degrees when fully elevated, but where rear elevation is not required the body may be tilted 50 degrees. Changing from rear elevating to rear dumping merely requires releasing a cable from the end of the body, which is also done from the seat.

Dumping Body of Steel.

The body is of steel with a division board of wood. It contains 92 cubic feet or 3.4 cubic yards and its total capacity for soft coal is 4600 pounds, or for hard coal 5000 pounds. The bottom corners are rounded to permit complete dumping. The tailboard is fitted with a scuttle door and has chain equipment for carrying bag coal. The top tailboard is removable. The mechanism is self-contained and supported entirely by the under structure of the body. The long arms are four-inch channel steel and lifting arms of best mild steel hand forgings. The worm and gear are enclosed in a grease tight case and the hoist is absolutely safe, as the worm gear will hold the body in any elevated position when loaded. The time of operation is 30 seconds to elevate body with load and 30 seconds to lower it. The time to deliver a full load of coal through the 18-foot chute is 150 seconds and the time to deliver it through the chute, body not elevated, is said to be 120 seconds.

This coal truck has a load capacity of two gross tons of coal and the weight of chassis and body is 5925 pounds. Its overall length is 198½ inches and overall height without cab is 69¼ inches, while the overall height with cab measures 100 inches.

The wheelbase is 130 inches and its turning circle radius is 25 feet six

inches; the tread of the front and rear wheels is 58¼ inches, while the road clearance under front axle is 10¼ inches and under rear axle 9½ inches. The overall width, over rear hubs, is 71½ inches, and the percentage of total weight of chassis, body and load on the rear tires is 74. The speeds are reverse, 3.33 miles, first 3.75 miles, second 5.75 miles, third 10 miles and fourth 15 miles per hour.

The second illustration shows an electric dumping coal truck built by the Couple-Gear Freight Wheel Co. of Grand Rapids, Mich., which is driven by the front wheels, utilized by the Ohio Coal and Iron Co. This is a rear dumping truck, having six tons load capacity. The body hoist is operated by an electric motor operated from the driver's seat.

English Double Purpose Truck.

A new Daimler motor coal truck for the municipality of Harrogate, England, is seen in the third illustration. The vehicle is a double purpose type for special and general use. The chassis is a three-ton Daimler built at Coventry, and is fitted with a tipping frame and interchangeable lorry and tank bodies. The iron tipping frame, which is shown in the accompanying illustration, is fitted to the chassis frame, and on this is mounted a lorry body. The sides and tailboards are made to lower, or alternatively, they may be detached so that the vehicle can be used with a plain platform body if desired. There are lifting hooks at each corner of the body to facilitate its removal when the vehicle is required for street watering purposes.

In addition to its use as a coal truck there is provided a water tank, which has an approximate capacity of 650 gal-

lons, built of mild steel and mounted on an underframe of English oak fitted with Wadsworth sprinklers. When the tank is in position, the tipping gear is easily operated by means of the two handles, one on either side of the vehicle, and when carrying a full load the tank may be adjusted to any angle up to the full limit of the gear. The use of the tipping gear in connection with the tank renders the sprinkling apparatus fully effective on gradients.

Bottom Dump Trailer Units.

The fourth illustration shows two five-ton tractors hauling a bottom dump trailer and another trailer developed at Long Island City, N. Y., by the Transport Tractor Co., Inc. In a discussion of the advantages of the tractor vs. motor truck, the designers of this coal tractor maintain that the development of the tractor as a means of carrying merchandise is similar to the development of transportation by horse flesh. Long ages ago some individual discovered that he could transport twice as much with one horse power by hauling it on wheels as he could by loading it on the animal's back, and wheels for load carrying revolutionized the transportation of the world.

The tractor advocates hold that in the present era the motor truck which carries the entire load on its own back represents the horse of an earlier age. The tractor which carries half the load on steel tired wheels, whose only function is to carry load, represents similar progress. The tractor which handles a five-ton payload is a smaller machine than the motor truck of equal haulage capacity, costing less to buy and less to operate. Hauling is invariably cheaper than



Transport Tractor and Semi-Trailer Used for Coal Delivery: These Load Carrying Units Are a Bottom-Dumping Type Adapted for Discharging of Loads Where Concentration Is Not Necessary.

carrying. They point out that the motor truck must stand idle while being loaded and unloaded. The tractor may be used without disconnecting it from the trailer, or it may be uncoupled from an empty trailer at the loading platform and without loss of time connected to a loaded one. With two or more trailers the tractor is kept in constant motion except for the aggregate number of minutes necessary to change connections. This flexibility, they claim, recommends tractor equipment for all installations where an appreciable time is required to load or unload.

Some Reasons for Economy.

It is held that the lower first cost of the tractor is due to its smaller size, which means lower gasoline consumption and smaller tires. The interest, depreciation and maintenance charges are also directly decreased. For every ton the average motor vehicle can carry it can pull from three to four tons on a properly constructed trailer, because in addition to carrying capacity every truck has another and far more important property draw bar pull. The increased tonnage moved with each tractor and the reduced cost of operation is a revelation to the man who has been using trucks. The bulk of the load carried on steel tires not only affords great economy, but insures a short turning radius, which allows the tractor with its trailer to be easily maneuvered in any traffic.

The advocates of the tractor claim that the lower purchase price as compared to a motor truck of equal capacity, ability to keep moving, and therefore earning during more of the working day, lower expense for tire renewal and gasoline consumption, simplicity of construction and operation, are reasons which enable the Transport tractor to haul at very low cost per ton mile.

Can Work in Small Space.

The transport tractor with any trailer will turn within a circle 25 feet in diameter and its simple control and light steering enables the driver to handle the tractor under difficult traffic conditions with greater ease than any truck. The flexibility of the motor enables it to pick up on high gear from a speed of four miles an hour with a full load. The tractor will back its trailer into difficult positions for unloading which could not

be reached by a long truck. The motor is filled with oil through a convenient filler pipe and transmission and universal joints are filled with grease every 2500 miles, while the rear axle requires lubrication once in 10,000 miles.

The Transport motor, developing at normal speed 25 brake horsepower, is smaller than is the usual truck or tractor of this tonnage rating. Inasmuch as a speed of 10 miles an hour is economical for tractor work, it is practical to use a motor of this size in connection with a gear reduction ranging from 45 to 1 on low to 13 to 1 on direct drive.

It is claimed that it is less expensive to operate a small motor than a large one and the Transport motor will deliver power to turn the traction wheels where many larger motors would fail. The Transport tractor is said to average better than eight miles to the gallon on gasoline.

A four-cylinder bloc motor with $3\frac{1}{2}$ -inch bore and $5\frac{1}{4}$ -inch stroke, rated at 25 brake horsepower, is used in the Transport tractor. The unusually large worm gear reduction in the rear axle makes practical the use of a motor of this size, obtaining maximum economy with ample power for all conditions. The L head design employs but one camshaft for the operation of inlet and exhaust valves and reduces the number of timing gears to three. The motor is further simplified by thermo-siphon cooling. There is no pump, pump gear or piping. The crankshaft bearings have a diameter equal to half the bore of the cylinders, much larger than in ordinary construction.

The radiator is of the honeycomb type, of copper, with heavy brass shell. It is mounted on leather seats back of the front member of the frame to protect it from collision, and there are two coil springs which take the rebound shocks, which insure long life. The transmission is designed to transmit 50 horsepower, more than double the rated power of the motor with which it is used. The transmission and clutch are contained in one housing, which bolts to the motor direct, forming an enclosed unit power plant. The gear shift lever is mounted on the cover and engages direct, operating a three forward speed ratio sliding gear selective system of transmission gearing.

The gear reductions between the motor and the rear wheels are for reverse, 55 to 1, and for low gear, 45.8 to 1, the intermediate being 24 to 1, and the high (direct drive), 13.6 to 1. The clutch is a part of the transmission unit and is designed to transmit double the horsepower. The frame is of five-inch channel section steel with two cross members and a 29-inch steel plate reinforced with angle iron for the support of the tractor.

COMMERCIAL MOTORBODY CORP.

The Commercial Motorbody Corporation, with offices at 50 East 42nd street, New York City, which has acquired a plant in Detroit, is to establish similar warehouses and shops in Chicago and New York City, where it purposes to have large stocks of bodies of all types ready for shipment or delivery. These will be produced by different manufacturers and statement is made that about 400 different styles or types will be sold, affording quick service to truck agencies, branches and to buyers. The officers of the corporation are: P. H. Patriarche, president and general manager; Charles M. Eaton, vice president; Addison G. Brown, second vice president and assistant general manager; A. B. F. Harraden, director of sales; O. A. Huener, assistant director of sales; J. M. Cunningham, director of agencies and publicity; J. Greenway Bain, secretary.

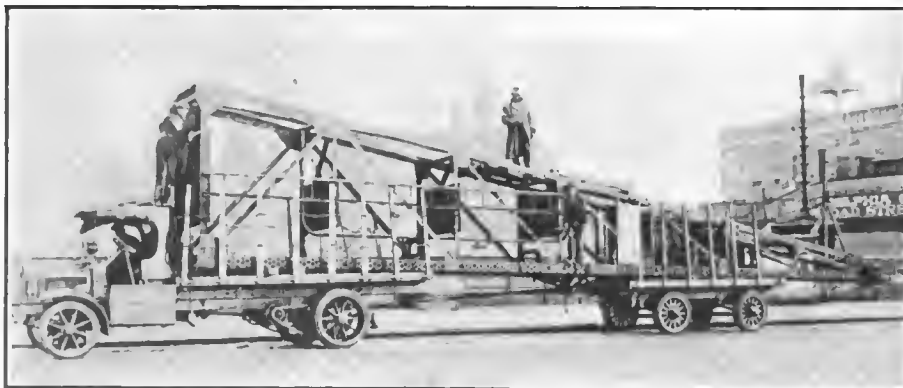
PERCIVAL EDITS "THE BOMB."

Capt. Charles G. Percival is editor of "The Bomb," a paper published occasionally during the life of Class 13 of the Motor Instruction Schools of the Ordnance Department, United States Army, which class is stationed for a period of instruction at Camp Herring at "Nashville," (otherwise Kenosha) Wis. The paper is largely given over to personal information and "hits" concerning the members of the class, so that its contents are best appreciated by them. These features are handled with the vigor and cleverness that have been characteristic of "Doc" Percival during his career as a newspaper and advertising writer, and made him known the country over.

STANDARDIZED TURNBUCKLES.

Standardization of turnbuckles, this being a proposal by airplane manufacturers, was considered at a meeting of members of the Society of Automotive Engineers held at Dayton, O. The opinion crystallized at the meeting, which was presided over by M. W. Hanks, was that there was need of such standardizing as rapidly as the dimensions and materials could be determined.

The automobile show at Hartford, Conn., March 30-April 6, will have a section for power trucks, which is expected to have a comparatively large number of exhibits.



Pile Driving Tower and Equipment Being Moved to an Atlantic Coast Port for Emergency Service with a White Truck and Trailer at Four-Hour Notice.

HAUL CANNON WITH TRACTOR.

As large as is the governmental organization of the United States, and as far reaching are its activities, no one of the departments has equipment so that it is absolutely independent in undertaking operations that may be necessary in carrying on the war. The War Department has garrisons, camps and cantonments in many parts of the country, most of which are equipped with whatever may be needed for ordinary and even emergency service, but from time to time work must be done which can only be undertaken with apparatus either specially designed or used occasionally in industrial or commercial enterprises.

There are instances where time is especially valuable, and then expense is not considered. The work must be done as quickly as is possible. One of the activities has been preparations for defense, which have been carried on at different strategic points, and in connection with such work batteries of cannon of varying sizes have been located. Since the beginning of the war fortifications have been built in anticipation of possible attack by fleets, and some of these are along the Pacific coast.

Near San Francisco military necessities entailed the removal of a battery of four cannon, each of which was 28 feet long and weighed when dismounted from the carriage approximately 10 tons. These were to be transported seven miles, and as the fort was on the beach near the water there was no road between it and the main highway. There was a path to the fort over which such supplies as were needed were drawn, but this was in some places through sand from three to nine inches deep, and it was narrow, with many short turns.

Several haulage contractors were asked to move the guns, but after surveying the road they refused to undertake it. The King Drayage Co., which operates a five-ton Garford tractor and trailer in its equipment, was willing to try the hauls, for the officials of the War Department did not want to expend money on a road that would probably not be used again. The work required

two days only, although very careful and slow driving was necessary, because of the sharp turns. In some instances the forward wheel of the tractor and the muzzles of the cannon were rubbing the banks. Five hours' work was needed to move each gun. Had not the tractor been used several times the equipment and much longer time would have been required. The result was so satisfying that the War Department had a special report made as a basis on which to make estimate for similar operations that may be necessary.

NO LICENSES FOR DRIVEAWAYS.

A special session of the Wisconsin Legislature has amended the law of that state regulating the use of power vehicles on the highways, so that where machines are driven from factories in or out of the state to distributing dealers or to owners, no special license is required. This will preclude the necessity of special licenses and will save a great deal of money for those who would under the old law have to obtain the same authority required for those residents of the state who use cars and trucks constantly on the highways.

BUILD 60 REO TRUCKS DAILY.

The Reo Motor Car Co.'s factory at Lansing, Mich., which is operating 24 hours a day, is producing 60 trucks daily, of which an average of 40 is driven from the plant over the road. The output of the works is sold mainly in the Middle West and the Atlantic coast states, and no machines are shipped East by railroad. An increase in the price of Reo trucks is expected about April 1.

The Backhus Motor Truck Co. has been incorporated at East Rutherford, N. J., with capital of \$125,000 by Herman T. Backhus, Jacob Bloom and George P. Young.

L. R. Johnson has been elected treasurer of the Jones Motor Car Co., Wichita, Kan. He was for three years auditor of the company.

WILL BUILD 200 TRUCKS.

The 2½-ton truck that will be built by the Walden W. Shaw Corporation, Chicago, is to have 144-inch wheelbase. The machine will have a unit power plant with a Continental four-cylinder engine, a dry multiple disc clutch and a Brown-Lipe transmission gearset with three forward speed ratios and reverse. The engine will have cylinder bore of 4½ inches and stroke of 5¼ inches, and it will be cooled by a circulation of water pumped through a cellular radiator with cast top and bottom tanks.

The drive will be by tubular shaft to a Timken worm drive rear axle geared 8.5 to 1 and the Hotchkiss type of drive has been adopted for propulsion. The frame will be built of six-inch steel channel section. The wheels will be fitted with 36 by four-inch solid tires forward and 36 by six-inch solid tires at the rear. The truck will be governed to 15 miles an hour. The price announced is \$2750 f. o. b. Chicago.

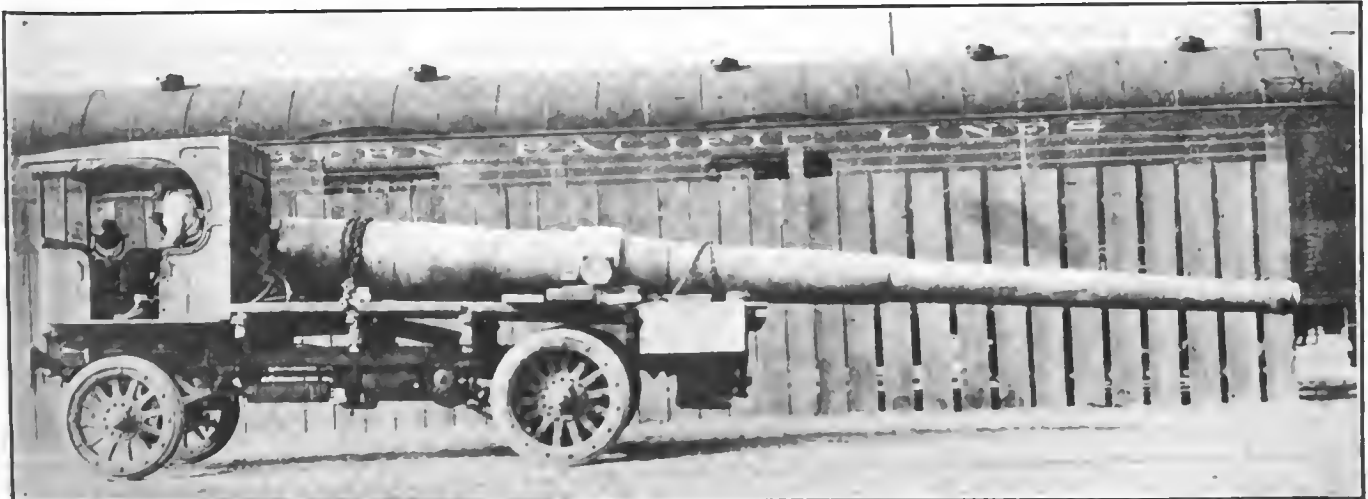
DAILY AIRPLANE MAIL SERVICE.

Daily airplane mail service between Washington, Philadelphia and New York, which has been planned by the Postoffice Department, and which is to be operated as special delivery of first class mail, will be inaugurated as soon as suitable fields for making landings have been obtained in those cities. There is reason to believe that trips will be made regularly about May 15 unless plans are changed.

TWO TRUCK TRAINS SENT DAILY.

Two trains of Packard trucks, consisting of 30 machines each and six Dodge cars, are started away from Detroit each working day of the week, each train being accompanied by a company of soldiers. The route is from Detroit to Toledo and thence over the main highways to the Atlantic coast.

The production plan of the Duplex Truck Co., Lansing, Mich., has been changed so that 300 trucks will be built each month during remainder of the year.



Garford Tractor Freight with a Coast Defense Cannon Weighing 10 Tons That Was Hauled Through Deep Sand from the Shore to New Fortifications in California.

Standard Mechanical Measurements with Resiliometer

The need of determining the exact qualities of any resilient material used for mechanical purposes has long been known to engineers, but this has never been practically possible until the invention of the Widney Resiliometer an instrument perfected by President Stanley W. Widney of the Widney Co. and the Advance Felt Specialty and Cutting Co. of Chicago. In contrast with this fact statement may be made that the elasticity and hardness of metals has been practically obtainable by measur-

thickness of material, in the same terms. In other words, the Widney Resiliometer will measure the thickness, hardness and resiliency of any resilient material quite as accurately as unyielding materials are measured by the standard micrometer gauges, and the indications are on a scale sufficiently large to determine these precisely. With this instrument all resilient materials can be standardized to any one or all three of the factors stated, and obviously these may be used for any mechanical purpose.

Universally Useful in Mechanics.

The instrument was perfected after four years' investigation, research and experiment by Mr. Widney, and it has been proven to be scientifically accurate. The physical qualities of materials can be positively ascertained, which is a large progress when one understands that until now nothing could be known

aside from "judging." Mr. Whitney conceived the instrument with a view of utilizing it in his felt business, but soon realized that the practical uses of it in industrial arts were well nigh universal—that it was not confined to the use he originally intended for it. Demonstration proved that it was almost indispensable in establishing absolute standards with reference to the physical qualities of resilient materials.

With the Resiliometer one can establish definite specifications on resilient mechanical parts. For the first time, with it, manufacturers will be able to ascertain definitely and positively the specifications best suited for particular needs

in any mechanical work. It obviates guessing entirely in any determination. Once a standard has been fixed the manufacturer purchasing any materials for any purpose can order with the exact knowledge of specifications written from the instrument.

Consists of Four Elements.

The Resiliometer is easy to understand and easy to operate, as it consists of four simple elements. It will be clearly understood by reference to the accompanying illustration, which specifies the different parts.

It consists of the anvil, on which the material to be tested is laid; a direct reading micrometer calibrated to indicate thousandths of an inch, a quadrant actuated by a rack and pinion, which carries the supporting wire for the

weight and registers through a plunger directly on the dial and the presser foot that contacts with the material and registers on the dial. Simple as is the operation of the instrument, the development of it has been difficult. Its operation, because of this reason, has been reduced to the extreme of facility and simplicity, as no more skill is necessary to obtain readings than to read the time of a clock.

How the Records Are Found.

A piece of resilient material is placed between the anvil and the presser foot, and as soon as the presser foot rests securely upon the material the dial hand will indicate the thickness in thousandths of an inch. When this reading is obtained the weight running in a guide at the rear is released and allowed to apply pressure upon the material until it stops from the resistance to compression. The operator then has two readings, the measurements of thickness with and without compression of a standard weight.

Assume the initial measurement was $\frac{1}{10}$ inch and the measurement under compression was .050. Then

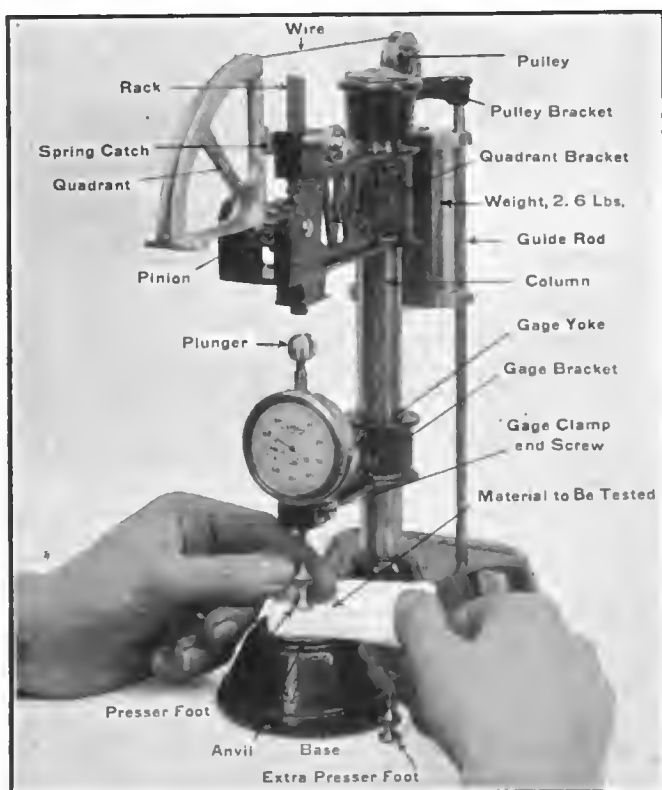
Original thickness.....100
Thickness under pressure......050

gives the hardness of the material—its resistance to pressure—as 50/100 or 50 per cent. Were the original reading 72 and the reading under pressure 54, then the material would be $\frac{54}{72}$, or 75 per cent. hard. A completely incompressible material would show a record of 100 per cent. hardness.

The Degree of Resiliency.

When the reading under pressure has been taken and the weight has been lifted as is provided for by lifting the quadrant of the instrument, the natural resiliency or expansion of the material when released from pressure will be indicated by the hand of the micrometer, which will turn backward. The degree of recovery in thousandths of inches is noted. Assume that the material which registered 50/1000 inch thickness under compression expanded so the indication was .080 when the weight was removed. The recovery amounts to .030, which is $\frac{3}{5}$ of 50, or the thickness under pressure, which gives a percentage of resiliency of 60 per cent.

As the Resiliometer dial indicates in thousandths of an inch, obviously the number of possible combination specifications, showing thickness, hardness and resiliency, is very large, and with these practically any conceivable combination of qualities can be specified. The utility of the Resiliometer in any engineering department is evident. With it exact qualities can be determined and these can be obtained with reference to practically any material that is in use. With this instrument truck manufacturers can standardize the felt parts, or any other parts for which resilient material is required which is a factor of special importance, when the demands of the government upon truck manufacturers necessitates obtaining absolute accuracy or standardization of the physical properties of materials.



The Resiliometer, for Measuring Thickness, Hardness and Resiliency of Materials, Showing the Manner of Obtaining Exact Specification Data.

ing instruments, and a device has been used for a considerable period to determine the resiliency of rubber tires for vehicles. But the accurate measurement of the thickness, hardness and resiliency of numerous materials used in mechanical arts, such as felt, fabrics, rubberized fabric, asbestos, leather, paper, packings of all kinds, fahrikoids, cork or anything that is compressible and has some degree of elasticity when released from compression could not be even approximately obtained.

The engineer and the expert mechanic will understand the possibilities of the uses of an instrument that will measure the degree of compression in thousandths of an inch, will measure the degree of expansion of a material when released from a given pressure and will measure

JONES ONE-TON TRUCK.

Following plans recently made public the Jones Motor Car Co., Wichita, Kan., has begun the production of a one-ton truck, and the designs for a two-ton chassis have been completed and the experimental work on this machine is now in progress. The building of the larger chassis will shortly be begun if no changes are made. The company has produced passenger cars for several years, these being sold generally in the Middle West and Southwest. President J. J. Jones of the company states that deliveries of the one-ton chassis have been begun, and a sales organization is now being developed. The purpose is to gradually extend this throughout the country.

The one-ton truck is constructed of standard units, the engine being a model N Continental, with cylinder bore of 3 $\frac{1}{4}$ inches and stroke of five inches, having a rating of 22.50 horsepower by the S. A. E. formula. This is combined with a multiple disc clutch and a selective transmission gearset, having three forward speed ratios and reverse in a unit power plant. The engine is lubricated by a combination force feed and splash system, the oil being filtered as it is circulated. It is cooled by a circulation of water forced through the engine jacket and a vertical tube radiator by a gear driven centrifugal pump. Radiation is supplemented by a large fan mounted on an adjustable bracket on the forward end of the engine block, driven by a flat belt from a pulley on the extension of the water pump shaft. The source of ignition current is a high tension magneto, and the carburetor is an automatic float feed type.

The power plant is mounted on three points to protect it against weaving of the chassis. The power is transmitted through a large tubular shaft with a universal joint at either end to a worm drive axle. The front axle is an I section steel drop forging of large size. The frame is pressed steel channel section that is well reinforced, with numerous cross members, and it is carried on semi-elliptic springs, the forward set being 44 inches long and two inches wide, with nine leaves, and the rear set 52 inches long and three inches wide, with 10 leaves. The wheelbase is 130 inches and the tread 56 inches. The wheels are wood, artillery type, with 34 by 3 $\frac{1}{2}$ inch solid tires forward and 34 by four-inch solid tires on the rear. The drive is left side and the control is standard in general character, with brakes of liberal size operating on and within drums on the rear wheels.

The chassis is provided with full equipment and weighs without body 2750 pounds. The price f. o. b. Wichita is \$1100. Statement is made that the company plans to produce 2000 of these chassis during the present year.

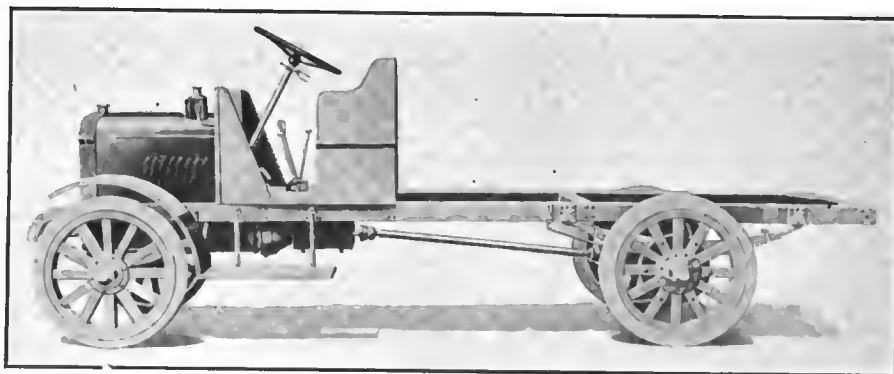
Van H. Cartmell has been re-elected president of the Kelly-Springfield Tire Co., and with him the entire board of officers and directors of the company.

PENNSYLVANIA STATE AID.

The attitude of Pennsylvania as reflected by the city of York, in that state, toward the overland transportation of vehicles through the commonwealth, is manifested by the arrest and detention of the drivers of 60 Oldsmobile cars, who were driving the machines from Lansing, Mich., to New York. The machines all carried tags "Car in Transit," but no license plates, being consigned to the distributor in New York City. The men were arraigned in court for violation of the state law requiring registration and were fined. The cars were released only when registration licenses for all were obtained. The cost to the New York distributor was \$720, which included fines, registration and the expenses incidental to the delay of the caravan.

AUTO INDUSTRY CENSUS.

All manufacturers of power vehicles have or will receive a blank from the National Automobile Chamber of Commerce with the request that it be filled and returned. The blanks require the number of vehicles built since the begin-



The Complete Chassis of the One-Ton Jones Truck, the First of a Series Designed to Be Built of Standard Units.

ning of the fiscal year, the volume of material ready for use, the number of vehicles contracted for, what production would be with and without the 30 per cent. curtailment arranged by the fuel committee of the industry and the fuel administrator. The reports will be filed by the chamber with the War Industries Board. While the reports are not sworn the board reserves the right to order special investigation of any company or number of companies when such inquiry appears desirable.

ORDER 19,000 STEEL WHEELS.

An order for 19,000 steel wheels for the equipment of vehicles used by the Signal Corps, U. S. A., has been given the Detroit Pressed Steel Co., Detroit. Delivery will be completed by June 1. Production has been in progress more than a month.

L. A. Closter has joined the Federal Motor Truck Co. as district sales manager for Michigan, Indiana, Ohio, Kentucky and West Virginia. He was for six years in Chicago with several automobile concerns.

Chalmers N.A.C.C. Representative at Washington

The National Automobile Chamber of Commerce, which was represented by Hugh Chalmers at Washington, he serving with A. C. Copland of the Motor and Accessory Manufacturers' Association, and John R. Lee of the Ford Motor Co., as the committee representing the Automobile Industries of the War Industries Board, voted to withdraw its representation from the committee at a meeting early in March, and to have Mr. Chalmers act for it exclusively.

The War Industries Board has established a committee headed by Robert S. Brookings as chairman, which will fix prices, or at least will advise President Wilson with reference to prices that shall be established. Naturally, the policy of the government as to prices will apply to the automobile industry quite as well as any other. The automobile industry is very largely directed

by the National Automobile Chamber of Commerce, and as its representative at Washington Mr. Chalmers will be a very important factor in the relations of the industry with the government.

The War Industries Board has not yet officially recognized Mr. Chalmers individually, and there may be need of some other action to bring about the recognition of the industry's official. Mr. Copland had not retired officially from active participation in the activities of the board, and for that reason his relations remained unchanged, though there is no assurance that this will continue.

The battery service station of the Electric Storage Battery Co., at Philadelphia, is now managed by G. H. Krouse, who has succeeded William H. Patten, who has been named to standardize the battery service at all Exide battery stations controlled by the company.

The trucks to be built by the Walden W. Shaw Corporation, Chicago, will for the first series be rated at 5000-6000 pounds load capacity.

Economy with Small Truck Trains

Time Saving in Long Distance Hauls Compared with Railroad Service

The real value of the power truck for economy is practical only in short hauls when compared with normal railroad service, but with the extreme congestion of all trackage and the shortage of cars material savings can be made where time is important. This has been demonstrated in many ways when the roads are in good condition. The best demonstrations of highway transport for long distance have been made during the past winter when the conditions were the worst known for years in the northern section of the country. Of course long mileage could not be made with a single driver to a truck on roads that were obstructed with snow, and for this reason the drives as a rule have been much less than they will be for the next seven or eight months.

Trips with single trucks on snow covered highways cannot be made as rapidly as when the machines are sent in trains, for in the event of accident or serious obstruction several men can do work that would be impossible for one. For this reason caravans have gone through where one truck would probably be much delayed, although progress may have been slow. The Federal Motor Truck Co. for the purpose of meeting an extremely urgent necessity sent a train of five trucks, two of the machines loaded with heavy parts, from the factory at Detroit to Washington in February, a sixth unit joining it at Toledo.

The route was through Akron, O., where the four empty trucks were freighted with tires. The train then

was driven eastward and southward in Pennsylvania and Maryland. The weather was extremely cold and the roads were covered with snow, to such depth in places that traffic was very slow. In some sections the snow had not been systematically cleared, and considerable delay was experienced. The trip was approximately 590 miles, and this was covered in two weeks, an average of about 50 miles a day. With the roads in good condition the trucks could have made 100 miles or more daily, and the actual cost of haulage reduced more than 50 per cent., but even with the delays the freights were delivered much earlier than they would had they been sent by railroad.

NEW STUDEBAKER PRICES.

The prices for Studebaker power wagons have been increased \$100 each, the statement being that this is necessary because of the advanced cost of materials of all kinds. The 1000-pound chassis now sells for \$1095 and the 2000-pound chassis for \$1400. The prices for the small machine with body is: Panel delivery, \$1085; express, \$1060; station wagon, \$1095. For the large machine: Stake platform body, \$1550; express body, \$1500; 16-passenger 'bus, \$1700; hearse chassis, \$1600.

Rather than increase prices the automobile dealers of La Crosse, Wis., at least those in the dealers' association of that city, have agreed to do business on a strictly cash basis, this being regarded as the better way of meeting the generally advancing cost of all supplies and accessories.

The Pittsfield Spark Coil Co., Pittsfield, Mass., has filed a petition in bankruptcy having liabilities of \$38,558, and assets of \$34,365. Of the liabilities, \$35,799 are due to about 125 unsecured creditors and \$2000 is due the City Savings Bank of Pittsfield.

Ship Trucks by Road From Factories

A very large part of the trucks now being shipped from factories in the Middle West to the East are driven over the roads, and as the weather will improve steadily there is every reason to believe that these trains will be extremely numerous during the spring and summer. Were the manufacturers to await the delivery of railroad cars for shipping the machines would be held indefinitely, and while the cost of road driving is probably double the railroad freights, there is reasonable certainty that the trucks will be received and can be delivered approximately when promised.

The saving in time by driving will vary with the distance, but as compared with railroad freightage which requires weeks for several hundred miles, the gain from a business point of view is very large. Because of the heavy traffic on the highways when they are wet and most susceptible to wear there will be need of concerted action by the towns through which the main roads pass making repairs promptly and fully maintaining the surfaces.

Careful attention will be necessary to the principal arteries of traffic on which the trucks are sent East, but this has been very largely provided for by the Highways Transport Committee of the Council for National Defense, which has the cooperation of the state and municipal authorities through which the roads pass. In many of the states provision has been made to obtain desirable legislation to insure repair of the highways and breaking or removing snow during the next winter. This statement applies specifically to New York state, where the main line of travel east from Buffalo is through a section where heavy snow falls during winter months.

Beginning March 14 trains of trucks ranging from 30 to 60 machines will be started from Buffalo to New York via Albany, and thence will be sent to the different points of shipment. In good weather fast time can be made on this route, which follows practically the line of the Erie canal, and there are few hills to climb. In some of the principal cities where the night stops are made provision is made to house the drivers, while the trucks are parked in public places. Generally these truck trains are manned by soldiers, whose discipline is good and who endeavor to maintain a schedule. According to estimate 300 trucks, valued at more than \$2,000,000, will be shipped overland on the Buffalo-Albany-New York City route the last two weeks of this month.

Harry C. Limbach has resigned as production manager of the Zenith Carburetor Co., Detroit, to become equipment engineer for the Strong, Carlisle & Hammond Co. of that city.



One of a Small Train of Five-Ton Trucks Driven from the Federal Factory at Detroit to Washington, D. C.

FARM TRACTOR INDUSTRY

NATION URGES USES OF TRACTORS

Influences Educating Farmers to Greater Crop Production Has Impelled Marked Progression in Power Machinery Manufacture



Threshing on the Big Farm of Merry Bros., Amarillo, Texas, with a Tractor and Separator—A Practical Service Equipment.

EXPLOITATION of farm tractor utility, which must be to those engaged in cultivation of soil crops, has been intensively engaged in for months by practically every body in any way concerned in agriculture.

What has happened with the tractor industry is precisely what has been experienced by the power truck industry—the military necessities have been so intense that every possible influence has been brought to bear upon the people to stimulate their use of machines to make up in part at least the shortage of man power. Through special, as well as the national, state and municipal organizations, and through all forms of civic bodies, constant pressure has been exerted to economize labor and food. Both of these are vitally important, but of the two food is even more necessary than labor.

The organizations engaged in this propaganda have been the national and state departments of agriculture, county farm bureaus, state food commissions, farmers' associations and societies, state agricultural and other colleges, special committees representing legislators, and differing commercial and industrial bodies. To even outline the campaigns that these have carried on would require many pages, and this is not briefly stated with the object of discounting the admirable work that has been done.

For instance, throughout New York state the bureau of production of the state food commission has at its disposal 61 tractors owned by the state, which have been leased to farmers for the coming season under one of three

plans. Of these the first is that the lessee may be a group of five or more, the second that the lessee be an experienced and responsible tractor operator, and the third is that the lessee may be an individual farmer. Of the machines 41 were used last year. When leased each will have with it a two-plow or three-plow outfit. The rental for the 1917 tractors and the two-gang plows is \$50 to \$60, with the three-gang plow \$75; for the 1918 tractors and two-gang plows \$75, and for three-gang plows \$100.

The lessees assume complete responsibility for the machines and must pay for all necessary repairs. Under plan one the use of the tractor is limited to plowing 40 acres for each member of the group, 20 of these in the spring and 20

in the fall. Under plan two the lessee may plow not more than 20 acres in the spring and 20 acres in the fall for any one individual. Under plan three the lessee can plow but 60 acres for himself, half in the spring and half in the fall. Under all plans the tractors are to be kept as nearly as possible in constant operation. The charges that may be made for work are \$1.25 an hour for a tractor up to 10-20 horsepower size, \$1.50 an hour for a tractor larger than the 10-20 rating, or \$3 an acre for plowing and 75 cents an acre for harrowing once over.

In Pennsylvania different county organizations are promoting the ring system of farming, in which the farmers agree to pool labor and equipment, working in groups. The groups are formed of farmers whose farms are adjacent and who decide by lot the sequence in which the work shall be done on each farm during the season. Tractors have been bought by subscription to be rented to the farming rings. The state safety and defense commission has appropriated \$50,000 for the purchase of 40 tractors to be leased to farmers in need of farm labor. The state department of agriculture has control of the machines and the intention is to have these operated practically continuously during the planting, cultivating and harvesting season of the year, working 24 hours a day with two crews.



Plowing with an Avery Tractor on a Farm Near Wellington, New Zealand.

BREAK STREETS WITH TRACTOR.

Breaking streets in the city of Springfield, O., which were snow obstructed, was the unusual though practical use made of a Heuber tractor owned by the Springfield Motor Car Co. of that city. The company is agent for the sale of these tractors and after a very heavy fall of snow a proposition was made the city's engineering department to use one to clear the main streets. The tractor was worked for several days and netted the company a satisfactory profit and a very large volume of desirable publicity, while the city was materially benefited. Besides this the farmers of the surrounding country were attracted to the sales rooms of the company in large numbers and a number of sales were made because of the practical demonstration of utility in winter conditions.

TRACTOR SHOWN IN NEW YORK.

New York City would seemingly be the last place in America that might be interested in farm tractors because of the utility of these machines in agriculture. Tractors can be used for a great

bought by the New Jersey Prison Inquiry Commission, for use on the farm at Annandale that is worked by the inmates of the state reformatory at Rahway. The intention of the commission is to work the state property intensively the coming season, which will be possible with the tractor. Last year the state fostered the cultivation of the farm because of the appeal for food crops, and the result was a profit of \$10,000. Because of the even greater need this year the prison commission acquired the tractor. Profit was not the primary object, but the combined result has been exceedingly satisfactory and is a splendid object lesson of the possibilities of intensive cultivation.

HOLT CAPITAL INCREASED.

Large increases in the plants of the Holt Manufacturing Co. at Stockton, Cal., and Peoria, Ill., are to be made. This company is the builder of Caterpillar tractors, which are produced in five sizes, and it has had a business throughout the world. The company has contracts with the War Department to build

proposes to purchase a site and erect and equip a factory for the production of a small tractor, the design of which has been determined and tested in differing work.

NEW MOLINE TRACTOR PLANT.

The Moline Plow Co., builder of Moline Universal tractors, is making ready to build a large plant at Poughkeepsie, N. Y., which will be given over exclusively to the construction of these machines. It will be adjacent to the existing works of the company and will employ many hands. The production may be judged to some degree by the statement that the pay roll when operated at capacity will approximate \$20,000 weekly. The intention is to have the works built, equipped and ready for occupancy as quickly as is practicable.

NEW TRACTOR COMPANY.

The National Tractor and Machinery Co. has been incorporated at Chicago, Ill., with capital of \$1,000,000 by G. W. Lawson, G. D. Bradford, J. M. Quit, Henry M. McKay and A. M. Windsan, all of that city. The purpose of the company is to engage in manufacturing farm tractors and other power vehicles, but no statement has been made relative to location of a plant or intended operations.

TRACTORS ON NEW YORK FARMS.

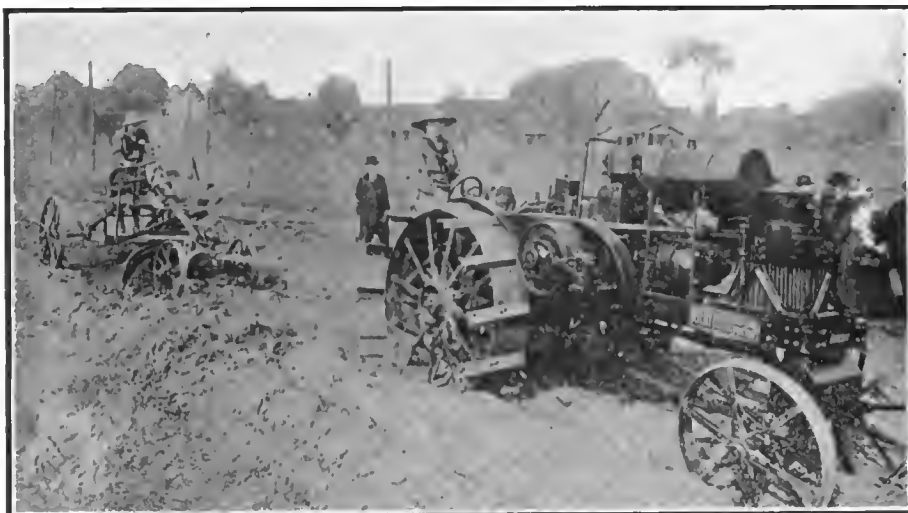
A very comprehensive idea of the very general demand from farmers for tractors is evidenced by a census of the farm activities and resources taken in Orleans county by the manager of the state farm bureau. This shows that there were when the census was taken 110 tractors owned in the county, and that while 633 horses were offered for sale, but 163 animals were required by those who desired to buy. Because of the shrinkage of farm labor the only manner this could be compensated was by the use of power machinery. Worked to capacity the tractors would more than make up the loss up to the present time.

WANT DUTY FREE TRACTORS.

The country council of Elgin county, Ontario, Canada, has petitioned the provincial government to allow the admission of American built tractors into that country, at least, free from payment of duty. This was believed to be one inducement for the farmers of the county to engage intensively in crop growing, because in no other manner could sufficient acreage be planted.

SELL TRACTORS FOR COST.

The Department of Agriculture of Ontario, Canada, has made contract for the purchase of 100 Ford tractors, which will be sold to the farmers of that province for cost. The price will be about \$750 each, with a freight charge of about \$25, making the total cost delivered about \$775. The plan of the department is to supply these machines to those making application for them until all are disposed of. The possibility of the contract order being increased has been considered, but thus far has not been determined. The Canadian delivery can be begun in April and be in abundant season for early work.



Vassar College Girls Working Tractors and Road Building Machinery During the Eastern States Exposition at Springfield, Mass.

diversity of work, but mobility and haulage capacity on rough land are two of the qualities that recommend them to those engaged in producing soil crops.

Yet one of the greatest attractions in Automobile Row, which is upper Broadway in the metropolis, is a Case 9-18 horsepower tractor and two-bottom gang plow, which has been displayed in one of the show windows of the H. A. Saunders Motors Corporation, agent for Case passenger cars.

The tractor was a curiosity to thousands who had never seen more than a picture of a farm, but created real interest among those who own country properties and have serious thought of cultivating them. It was productive of innumerable inquiries and undoubtedly was a suggestion of material value that will lead to intensive cultivation on much larger scale on numerous estates owned by New Yorkers.

TRACTOR FOR PRISON WORK.

A tractor and the farming equipment that can be operated with it has been

a large number of machines of varying haulage capacity, these to be used for general transportation as well as service for which horses were exclusively utilized until the European war.

The company recently was authorized to increase its capital by the issuance of 3968 shares of preferred stock and 5000 shares of common stock, of par value of \$100 each, which were taken by the stockholders. The total, \$896,800, will be used in the expansion of the plants, for without very large increase of manufacturing facilities the contracts now on hand could not be filled.

COUSINS TRACTOR CO. PLANS.

The Cousins Tractor Co., Hanford, Cal., has been authorized to issue and sell 75,000 shares, 40,000 of which will be to the Cousins-Howland Auto Co., for all the property and assets of the business of the concern, which has been acquired by the Cousins company; 17,500 shares will be sold to the incorporators at \$2 each, and 17,500 will be sold to others. With the proceeds the company

Hess-Bright Ball Bearings



Motor Truck Quality

Never before has there been such a need of motor trucks for quick and economical transportation. The demand is for trucks capable of enduring strenuous and uninterrupted service with a minimum of attention or repairs. Trucks with Hess-Bright Ball Bearings, at

all important points, are invariably those of superior quality. You could hardly desire better assurance of careful construction than to have Hess-Bright Ball Bearings in your trucks. They forecast economical and enduring service with quiet, smooth, efficient operation.

THE HESS-BRIGHT MANUFACTURING COMPANY

Where Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

TRACTOR BUILDERS ORGANIZE.

The National Conference of Tractor Manufacturers was formed at a meeting of the representatives of 26 different concerns engaged in the industry, held at Chicago, March 14, the intention being to continue this so long as may be desirable or until conditions require a change of organization and policy. The following companies participated in the meeting, which was called by Daniel F. Charmichiel of the New Age Tractor Co., Minneapolis, Minn., and for which Clifford Thorne, attorney for the Square Turn Tractor Co., Chicago, served as secretary:

Evans Manufacturing Co., Hudson, O.; Andrews Tractor Co., Minneapolis; Leader Tractor Co., Des Moines, Ia.; Gray Tractor Co., Inc., Minneapolis; F. C. Austin Co., Inc., Chicago; Illinois Silo and Tractor Co., Bloomington, Ill.; Wayne Tractor Co., Detroit; New Age Tractor Co., Minneapolis; Elgin Tractor Co., Piqua, Ill.; Square Turn Tractor Co., Chicago; Reed Foundry and Machine Co., Kalamazoo, Mich.; Lang Tractor Co., Minneapolis; Topp-Stewart Tractor Co., Clintonville, Wis.; Leonard Tractor Co., Jackson, Mich.; Common Sense Gas Tractor Co., Minneapolis; Appleton Manufacturing Co., Batavia, Ill.; Interstate Tractor Co., Waterloo, Ia.; John Lauson Manufacturing Co., New Holstein, Wis.; National Tractor Co., Chicago; Acme Harvesting Co., Peoria, Ill.; Gile Tractor and Engine Co., Ludington, Mich.; Strite Tractor Co., New York, N. Y.; Gilson Manufacturing Co., Port Washington, Wis.; Beeman Garden Tractor Co., Minneapolis; Stinson Tractor Co., Minneapolis; Peoria Tractor Co., Peoria, Ill.

An executive committee was organized, consisting of D. F. Charmichiel, Minneapolis, chairman; F. H. Cozzens, New York City, vice chairman; W. B.

Gleason, Minneapolis, secretary; G. S. Albaugh, Chicago, treasurer, and A. Violette, Detroit. This committee will direct the activities of the association.

A Tractor War Service Committee, consisting of James R. Collins, Peoria; D. F. Charmichiel, A. Violette, W. R. Gleason, H. D. Lauson, New Holstein, Wis.; G. S. Albaugh, F. R. Beeman, Minneapolis; F. H. Cozzens, J. M. Robinson, Peoria; John Hurlburt, Detroit; D. Fitchman, Waterloo, Ia.; R. T. Evans, Hudson, O., and H. W. Adams, Minneapolis.

The meeting took place as the result of a conference of a few manufacturers at Washington at the request of A. Violette of the Wayne Tractor Co. The objects of the conference are stated to be to stabilize the industry, to have an organization in which all shall have free expression of opinion, to obliterate unfair practices of any kind, to collate statistics relative to tractor use and service to be presented to the government to substantiate the claim that the farm tractor is an essential, and obtain equitable preferential recognition. The purpose is to ask all tractor manufacturers to join the association, that their active cooperation may be enlisted, and the industry as a whole work united with the agricultural department and the food administration, to stimulate the industry and the production of crops to the fullest degree.

COOPERATIVE TRACTOR WORK.

In the Southwest, where the season has already well advanced and planting has been done to some extent, a very vigorous effort has been made to encourage farmers to cultivate the largest number of acres that can be worked. Practically all of the commercial organizations have joined in what may be termed a planting campaign and in Houston the manager of the agricultural department

of the Chamber of Commerce of that city interested all members of the Harris county advisory committee in urging farmers who owned tractors to plow ground for all for whom work of this character can be done.

This was in effect stimulating cooperative tractor service and lists of tractor owners and of farmers who would engage tractor work were compiled, a plan being evolved so that the owners and farmers could communicate with each other with reference to work. In addition to this a plan was made so that owners of tractors might rent their machines to responsible men who would engage in contract work to the end that the fullest utility of the machines could be realized.

The facts stated above demonstrate how intensively plans have been made to work the tractors available to the greatest practical degree, and how cooperation has been brought about to compensate the existing shortage of labor. Obviously the work done with these machines will lead to a very keen demand for machines in that section of the country.

MASSACHUSETTS BUYS TRACTORS.

Massachusetts through its state board of agriculture has obtained option on 1000 tractors which are to be delivered within the next few weeks, which are to be sold outright to farmers or are to be leased to them at a flat price an acre. The statement is made that the machines will be sold at cost, or in some cases for less, according to the conditions, and that the price exacted for the use will be \$5 an acre for the season. The conditions of the leases have not as yet been stated. The distribution will be made to farmers where there is the greatest shortage of labor.

TRACTORS IN THE NORTHWEST.

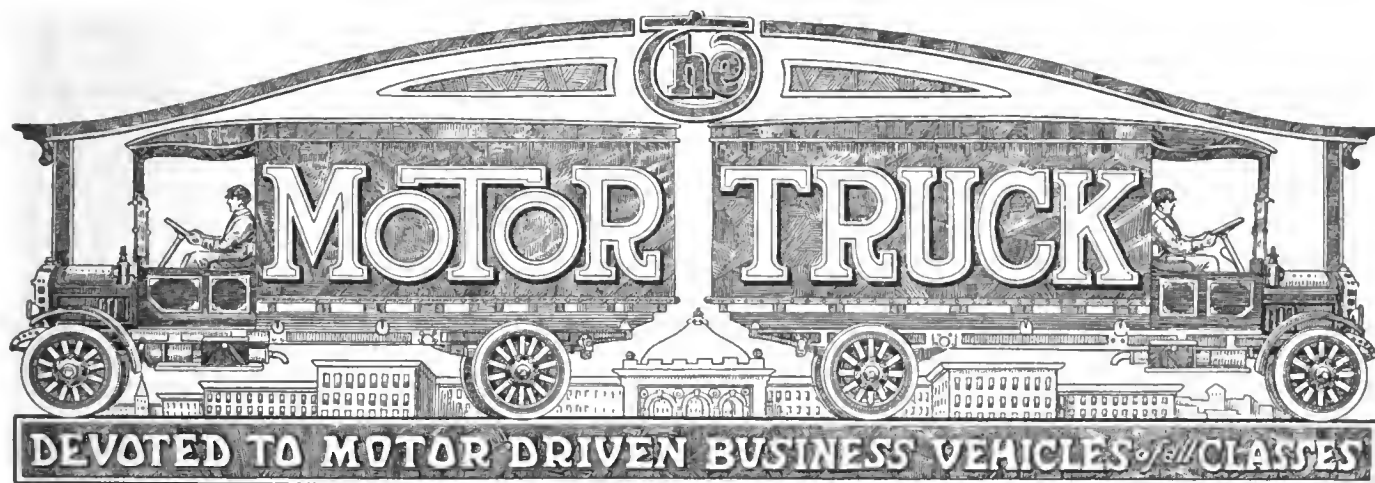
Statement is made by tractor and implement dealers in the Northwest that the demand for both types of machinery has been greatly increased and the number of sales is dependent merely upon the transportation facilities and the means for distribution. Where the farms are considerable distances from railroads the tractors must be driven over the highways, which affords the buyers some practical experience in driving.

MANUFACTURERS HOLD SCHOOLS.

Many of the tractor manufacturers of the country, especially those producing machines in large numbers, like the International Harvester Co., for instance, have organized tractor schools that have been conducted at towns and cities convenient to the branches or service stations. These have been given over to regular sessions, directed by men who have been trained in this class of educational work, dealing with practical subjects and demonstrations of the machines built by the companies. These have been well attended, for invariably farmers have been interested in the general proposition of larger crop production and the use of machines instead of manual labor.



Training Women to Drive Farm Tractors in England: Mrs. Guest in a War Workers' Test Near Birmingham, Qualifying as a Driver. (C) Underwood & Underwood.



Vol. IX. No. 4.

PAWTUCKET, R. I.

APRIL, 1918

MULTIPLE-PROFIT CONTRACTS

Power Truck Utility Insures Greater Returns from Material Production, Haulage and Construction for Best Known Contractor of Lynn, Mass.—Quick Work with Equipment Minimizes Supervision

CONTRACT haulage is today understood to be specialization in highway transportation. Contract construction is distinctly another class of work. The two are related in that material of any kind must be transported. Generally the haulage contractor will do work for the construction contractor, usually as sub-contracts. Occasionally the construction specialist will operate his own haulage equipment, provided that the work is sufficient to justify investment in it and the operations are continuous, but rarely indeed will the haulage contractor engage in construction work and, with his equipment, make the profit that would necessarily be divided were it done by two different concerns.

David J. Sheehan, whose office is at 424 Broadway, Lynn, Mass., and whose work, as he expresses it, is "all over Massachusetts," is what might be termed a combination contractor, in the sense that he engages

either in transportation of materials or commodities of any description, and he will undertake construction of any kind, from a sea wall to a foundation, from a sidewalk to a highway. He has erected buildings and built sewerage systems and highways in all parts of the Bay State have been constructed by him.



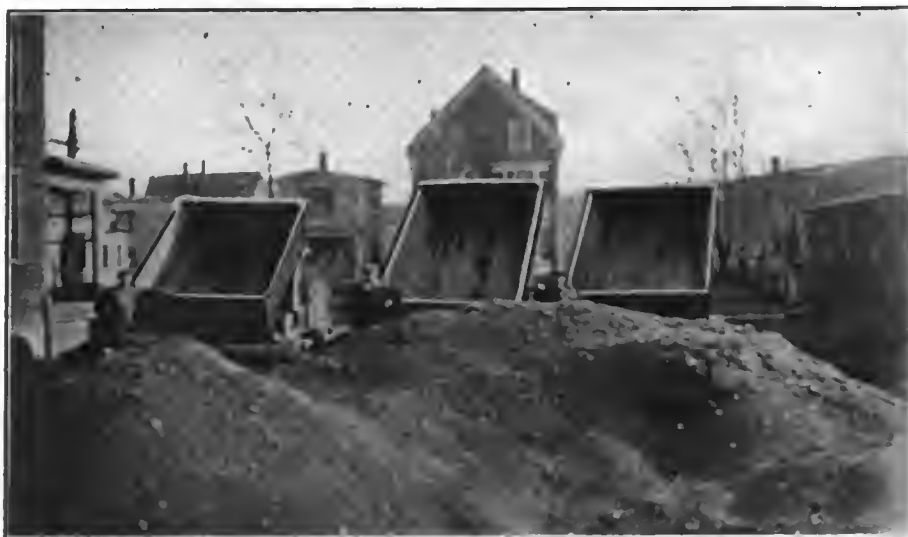
D. J. Sheehan's Three Five-Ton Hall Trucks Making Delivery of the Last Loads of the Day at the Factory of the Renton Heel Co., Lynn, Mass.

Until two years ago Mr. Sheehan was one of the largest haulage contractors in New England, doing this work in connection with general contracting. He operated with 144 head of horses and a great deal of general equipment, the greater part of his activities being in the northeastern section of Massachusetts, especially along the "North Shore" between Boston and Newburyport. He had two contracts that involved large amounts and because of the increased cost of labor and material incidental to the European war he lost heavily in carrying these to completion.

Next a fire destroyed a barn 235 feet long, 40 feet wide and two stories and a basement, and with it property of large value was consumed or damaged, and Mr. Sheehan was further crippled financially, but not in the least discouraged. With his remaining resources he started to rehabilitate himself, and his operations were for a time exceedingly limited. He says that he has had to make each day count as two to make the most of his contracts, and he has had to bid low to be sure of getting them, and with shortage of labor and high prices for both work and material the only certainty of profits has been through his personal supervision.

Willing to Undertake Any Work.

He says that he will do any work and that he works about 20 hours a day, and that if he has anything like reasonable success he is going to get back what he has lost and a good deal more. Mr. Sheehan has undertaken a good deal more than the average haulage or construction contractor because he has greater incentive to accomplish greater results.



**Part of the Coal Handled in One Day—Every Ounce Shoveled from Railroad Cars—
155 Tons Hauled Two Miles in Less Than 10 Hours.**

Mr. Sheehan has been in business about 17 years and he operated entirely with horses in his work up to last September. It was his custom to pay high prices for animals, buying these by the carload at Chicago once a year, and disposing of those that had not maximum service ability. Some horses were worth when he bought them from \$700 to \$900 a pair, and several pairs weighed close to 4000 pounds. One of his horses weighed 2040 pounds, and another that weighed approximately the same was sold to a fancier who has exhibited a team of nine animals, the weights ranging from 2000 to 2400 pounds in all parts of the country for advertising purposes. This statement is made to establish that the equipment he worked with was relatively expensive, but, from his point of view, was efficient whenever hard work was required.

Had Many Construction Works.

As a contractor Mr. Sheehan has done a good deal of work in Lynn and other cities within a compara-

tively short radius. In Lynn he has erected a number of municipal buildings, and he has built much of the large sewer that has been connected with the sewerage system of the city. Besides these he has carried out many other contracts, such as foundations, walls, bridges, culverts, walks, drives and streets, in all of which he used animals, and in a good many instances he purchased materials from dealers and procured such equipment as was necessary for doing the work.

Statement has been made that utilization of equipment and labor was necessary to make a profit. An example of possibilities is the building of a brick barn to replace the wooden structure destroyed by fire. This is 175 feet long, 40 feet wide and two stories and basement, and it was completed in 68 working hours, there being 100 men on the job. And the barn is admirably equipped and is one of the best in New England, having abundant room for 100 horses, and nothing in its appearance indicates that it was built in less than the time that would be required to construct a tool and material shack if the needs were less pressing.

The Sheehan policy is to rush work as rapidly as is possible. Mr. Sheehan maintains that the cost is less where as many men as are obtainable can work, because the supervision can be equally good or even better, and rapid completion releases the one directing it for what can be made equally productive. There is no good reason why a superintendent who can handle many men should not supervise the work of many and make their labor productive instead of overseeing the labor of a few. In other words, as he directs his own men he wants to make the most of his own time, a policy that is just as applicable to the work of others

who superintend work. As he frequently has work in different places he uses an automobile and divides his time where he believes there is greatest need.

Because of the high price of horses, the greatly increased expense of maintaining them, and that the work that could be done with them was necessarily limited, Mr. Sheehan last summer decided to experiment with power trucks. There was another reason, and that was that the labor shortage and the large wages demanded necessitated obtaining the greatest degree of productivity of men, which could only be practical through minimizing all waits for vehicles in work where such equipment was used. By this is meant that wherever possible the time of haulage should be shortened, which could not be done with animals, but could be done with power trucks.

Operates Crushed Stone Plant.

Mr. Sheehan has a stone quarry in Lynn not far from his yard equipped with a crusher and bins, the

plant having a capacity of about 350 tons of stone a day. This he operated, supplying stone to builders and contractors, and producing whatever was required for his own contracts. The quarry is not reached by railroads and all stone sold must be delivered by Mr. Sheehan or hauled from it by the purchaser. The location is advantageous from another aspect, being central, and the cost of delivery to the majority of building operations is relatively small.

Mr. Sheehan decided to dispose of his horses so far as this would be economical with reference to winter work and replace some of them with trucks. In September, 1917, he purchased one five-ton chain driven

contracts he could make the profit on the stone and the profit on the contract work, this being more productive than either work separately and justifying longer hauls than would be practically profitable were he operating the quarry independently. Besides this, he believed that there would be sufficient contract haulage in the winter to keep trucks working when horses would be the least productive and the most expensive to operate.

Early in November, 1917, Mr. Sheehan bought a second five-ton Hall truck equipped as the first. He had disposed of more horses and there was prospect of abundant work for machines, but the immediate need was completing a contract for work in Atlantic avenue, Boston. Cold weather was near and quick action was necessary before outdoor construction was practically closed. The contract required the delivery of 1800 tons of crushed stone, which was hauled from the quarry at Boston street, Lynn, in 17 days, an average of 106 tons a day. This was done by working the trucks as long as was necessary.

The distance from the quarry to where the stone was delivered



Two of the Sheehan Trucks Loading in the West Lynn Freight Yard, Three Men at the First and One at the Second—The Three Cars Seen Were Practically Cleared in One Day's Work.

Hall truck and operated this in stone delivery so far as was possible, working it for all long hauls and using horse teams for the deliveries within two miles. This truck was equipped with a steel body and a hydraulic power hoist. Loading at the quarry with either carts or truck was by gravity from an elevated bin. The carts were all dumped manually, which could be done with little loss of time, and the power hoist of the truck would elevate the body and lower it in approximately a minute if the load was free discharging. Obviously the principal gain in the use of the truck was by greater load capacity and speed.

Work Record Showed Large Economies.

A careful record of the work done with the truck in a short time was sufficient to convince Mr. Sheehan that if the machine endured for the anticipated service life there would be a large economy as compared with horses for a considerable part of the haulage from the quarry. The logical use for it was to find work where it could be advantageously used, and in construction



Truck Ready to Start, the Shovelers "Trimming" the Car Before Going into the Next—Note the Height of the Car Sides, Over Which All Coal Was Lifted with Shovels, There Being No Trestle on Which to Discharge the Cars.

is by air line close to 10 miles, and by highway probably 11 miles, but there are no hills of consequence and comparatively slight grades in either direction. The traffic is usually heavy in Commercial street and Atlantic avenue in Boston, so that the best speed could be made after the customary working hours. The most work done any one day with one truck was the delivery of 63 tons of stone in 21 hours, starting at 4 in the morning and using two drivers. As the daily average tonnage for the contract for each truck was 53, one will understand that to make the delivery in

the period stated the trucks were worked overtime. Each round trip, with loading and discharging by gravity, and without delays of any kind, required approximately two hours. Making delivery of the stone in the 17 days was probably a record for this kind of work for New England, and perhaps for any section of the country. The conditions so far as the highways were concerned were good, but the weather was cold.

The work done was exceptional and could not be expected to be continuous save with two drivers. With any other equipment haulage of the tonnage for so long a distance would not be possible. Only the quarry, the haulage and the contract profits combined justified so long hauls, for with the comparatively small value of the stone the margin of profit was very limited. Only the weather conditions and the extreme need justified the work. The undertaking, however, is a capital illustration of the elasticity of truck service, but there are limitations always to the distance that hauls can be made economically.



Two of the Fleet of Three Hall Trucks Operated by D. J. Sheehan for Contract Haulage, Stone Delivery and General Construction Work.

During the winter the trucks were worked long hours, for the extreme shortage of coal and necessities of delivery impelled manufacturers to have fuel hauled as it was received, frequently in very small quantities. A great deal of the coal came in cars into the freight yard at West Lynn, where every pound had to be shoveled from the cars into the trucks, there being no facilities for discharging it by gravity from the cars into the trucks. As the coal was frequently frozen solid, thawing with steam when this was possible or breaking with picks and bars was necessary before loading, the labor cost was excessive, and the only economy practical was driving the trucks to maximum speed wherever this could be done. Emergency service justified prices that could not be normally expected.

During the winter Mr. Sheehan disposed of practically all his horses so that at the first of April but six were in the stable, and he purchased a third Hall five-ton truck with steel dump body and hydraulic hoist. The reason for the purchase was the beginning of the

construction season of the year and that he was about to begin operating the stone crushing plant, a number of contracts for stone having been obtained. Mr. Sheehan proposed to operate the plant to capacity and three trucks would not be too great haulage equipment to make delivery within a reasonable distance. He intended, of course, to utilize the animals he had for such work as was practical with them.

Plenty of Work for Trucks.

The rapid fire changes that may develop through making work contracts was well illustrated when shortly after April 1 Mr. Sheehan was the lowest bidder for a work that will continue for eight months or more, and which can best be done with combination equipment—both power trucks and horse carts, and this necessitated the purchase of a score or more animals. To this, in all probability, will be added several five-ton trucks, for this season there is greater demand for highway haulage than ever before.

Mr. Sheehan says that he had contemplated operating a haulage service between Lynn and New York City. He can obtain all the freight that can be carried and business men are willing to pay very liberally for service. This project was given over because of the local demands for haulage and that Mr. Sheehan's resources are limited. Had he capital, he maintains, he could use a very large freight-carrying equipment in a Boston-New York City service and be assured of substantial returns. As in all transportation work the larger the operating scope the better the prices and the greater the measure of the earnings.

The Renton Heel Co., a large Lynn concern, that specializes the manufacture of shoe heels, has a plant located in Boston street, slightly in excess of two miles from the Boston & Maine railroad freight yard at West Lynn. In common with other manufacturers of New England the company is already stocking bituminous coal, and the first shipment was received at the freight yard April 14. It was shipped in four steel bottom-discharging coal cars and a regular box car, the five units having freights that aggregated approximately 265 tons. Because of the demurrage charge when unloading of cars is delayed, and desiring to cooperate with the railroad and the local and state fuel administrator, the company made contract with Sheehan to deliver the coal at its factory as rapidly as it was received at the freight yard.

Quick Handling of Coal.

With the three trucks and three men, besides the truck drivers, unloading was begun at 7 o'clock the morning of April 15. The five cars were on No 15 track, and between this track and the freight house is a paved area about 40 feet wide. This was advantage-

ous in that the surface was smooth and hard, but traffic to and from the freight house necessitated some slight delays. Every pound of coal hauled had to be shoveled from the cars into the trucks. So long as the coal could be tossed over the sides of the cars without swinging lifts the work was rapid.

To illustrate, the first truck was loaded in seven minutes by the six men, and the next truck was loaded by five men and the third and each successive truck load by four. The time of loading increased as the level of the coal in each car was lowered, for it had to be thrown up and over the side, and as the coal fell constantly toward and into the hoppers at the bottoms, more and more time was necessary. Not only this, as the work continued the men tired, and they worked slower.

The distance from the entrance to the freight yard in Bennett street to the Renton plant is slightly more than two miles, and the round trip about 4.1 miles by speedometer. The average time for the trucks to deliver loads ranged from 20 to 25 minutes, but with one man added to the shoveling gang in the afternoon the loading time increased until approximately 45 minutes were required for the last three freights. During the morning one truck was diverted from the work and made three trips from the Sheehan yard to a work at Saugus, carrying two loads of eight tons each of crushed stone and 125 bags of cement.

The work of the shovelers on the cars ceased about 5 o'clock because the men were thoroughly wearied with nine hours constant loading, for there was no time when a truck was not loading. The three trucks made 27 trips with coal, carrying 155 tons, this being an average of five tons, 1480 pounds to the load, and two of them were driven 42 miles and one was driven 66 miles, this including the three trips to Saugus. The gravity loading at the quarry compensated for the additional mileage.

Three of the cars were nearly unloaded—they were laden with 17½ tons, and the other two, one of which was the box car, was left for the following day. The expectation was that the remaining 108½ tons would be delivered by noon. The coal was dumped in the yard of the Renton company in front of the boiler house, and one of the accompanying illustrations shows the coal dump with the three trucks delivering the last loads of the day. The tonnage handled can be the better realized when the proportions of the dump from two sides are seen in the illustrations.

Mr. Sheehan has a building once used for wagon storage in which the trucks are stored. He purposes to increase his equipment and may then build a garage, equip it with facilities for making repairs, replace-

ments and overhauls and employ a mechanic to maintain the trucks. Thus far he has had all work on the machines, either adjustment or repair, done at the service station of the Hall Motor Truck Co. of New England, 1123 Commonwealth avenue, Boston. He hires good drivers, pays them high wages and expects them to earn their pay by working hard and keeping the trucks moving every minute. He maintains that large profits can be made with power truck equipment, if his own experience is a basis on which to judge, and that the economies obtained with it are practically unlimited in all save work where vehicle waiting time is not the main factor.

MACK TRUCKS IN ARMY SERVICE.

A train of 60 Mack trucks, manned by three officers and 104 men, was driven from the Twenty-Third Engineers' Depot at Harrison, N. J., to Camp Belvoir, Va., the start being made Feb. 26. The route was across New Jersey to Philadelphia, and the accompanying illustration was made on the Lincoln



Train of 60 Mack Trucks Driving from Harrison, N. J., to Camp Belvoir, Va., on the Lincoln Highway Between Newark, N. J., and South Amboy. (Copyright by the Committee on Public Information.)

Highway between Newark and South Amboy, N. J. Driving as when the photograph was made an enormous traffic could pass in either direction on the average state highway, and in spring, summer and autumn the mileage might be as much as 250 a day with changes of drivers.

NEW PRICES FOR DENBY TRUCKS.

April 15 the prices for three of the four sizes of Denby trucks were advanced by the Denby Motor Truck Co., Detroit. The 2000-pound chassis was increased from \$1490 to \$1650, the 4000-pound chassis from \$2025 to \$2350, the 6000-pound chassis from \$2525 to \$2775, and the 10,000-pound chassis will continue to sell for \$4900.

The prices of Rainier trucks have been increased, that of the 1000-pound size from \$995 to \$1150, and that of the 1500-pound size from \$1150 to \$1250. The price of the 3500-pound chassis has not been advanced.

All-Season Full Enclosed Cab For Trucks



The All-Season Cab of the Detroit Weatherproof Body Co., with All Windows and Doors Open, as in Summer.

An extremely practical cab, so designed that it can be installed on any truck chassis, is now produced commercially by the Detroit Weatherproof Body Co., Pontiac, Mich. The cab is intended for permanent installation and it can be closed in storms or cold weather to afford the driver the fullest protection. The front, side and rear windows are so placed that the driver can have full view of the road at all times and can observe the front wheels, this being necessary where the truck must be driven close to objects, either in limited space or in traffic. Any part of the cab, either doors, windows or windshield, can be opened or closed instantly by the driver without dismounting, which is an especially desirable quality.

In designing the cab two principal objects were sought, durability and full protection. Appearance was secondary, but the cab, as will be evident by reference to the accompanying illustrations, is not unsightly, and it is very roomy and has ample space for a driver and helper. The cabs are constructed with hard wood frames, strongly reinforced, and the panels are 20-gauge steel, so that when assembled the structures are extremely rigid and will endure the hard usage that may be expected when vehicles are in constant service and heavily loaded.

As will be noted the cab has a permanent front that is fitted outside of the

dash, and in this are two large windows. Back of this are the side doors, and the side panels, the doors and the panels having windows. In the back is another large window. The roof of the cab is constructed with a space between the ceiling and the top or cover. The doors and the windows of the side panels are what may be termed a disappearing

type, these sliding upward into the space between the ceiling and the roof of the cab. The doors and windows are flexible and the frames are constructed of side members of clock spring steel with steel rod cross members that slide in steel channel guides, these being covered inside with fabrikoid and outside with a high grade imitation leather, with celluloid lights of large size, through which there is unusually good visibility. Handles are conveniently located on the doors and windows so that any one can be raised to any desired height with a single movement, and they will remain wherever placed.

In the front frame the right window has a large light of glass, and this frame swings upward and can be attached to the ceiling. At the left side, ahead of the wheel, is a miniature windshield, the upper half of which can be adjusted at any angle. In the back of the cab is a wide window with a two-section sash that is divided vertically, each section sliding horizontally. The cab has a 40-inch seat, upholstered with fabrikoid. The roof is so strongly built that it cannot be broken save by extraordinary means.

All angles and corners of the cab are bolted together, and the whole frame bolts to the sides and front of the seat frame. When shipped the cab is disassembled into seven units that are packed in a crate five feet square and one foot deep, which will be accepted under the railroad classification of automobile tops. Statement is made that two workmen can uncrate, assemble and install the cab on a truck chassis in three hours. The tops are painted a battleship gray at the factory and can be repainted in the colors desired by the purchasers, but special painting can be done before shipping from the factory.

The tops are suited to use the year round. The sliding doors obviate space allowance at a loading platform, which allows closer work than is practically possible with swinging doors, and in driving through congested traffic the doors may be instantly lifted for emergency hand signaling by the driver. This cab is the first equipment of the kind produced and the qualities are such that it will recommend itself to truck owners. The Detroit Weatherproof Body Co. has prepared to produce these cabs in large numbers.

After service for a year as factory manager at the plant of the Chevrolet Motor Co., Flint, Mich., H. L. McInnes has been transferred to the headquarters of the General Motors Corporation, New York City, his place being filled by Thomas Haughton.

R. G. Grammand, who was in charge of the adjustment department of the Reo Motor Car Co., Lansing, Mich., has become head of the industrial relations department, succeeding Dr. W. N. Lawrence, who has resigned.

The Packard Motor Car Co., Detroit, has recalled to the factory F. J. Bury, service expert, who was for a considerable period stationed at the St. Louis, Mo., branch.

The Mason Tire and Rubber Co., Kent, O., has elected W. A. Cluff, its auditor, a member of its board of directors.



Truck Equipped with the Detroit Cab with All the Windows and Doors Closed, Affording Perfect Comfort for the Driver at All Times.

SIDELIGHTS ON LONG HAUL TRUCKING

Experience During the First New York-Washington Drive with a Five-Ton Electric—Road Conditions—Cross-Country Haulage Problems

By F. NELSON CARLE.

THE railroad would not take the truck due to embargo, and space on the Norfolk boat was sold weeks ahead. The customer in Durham, N. C., needed the truck to handle tobacco, much of it ultimately for Our Boys, so when we found we could ship it from Alexandria it was decided to run it over the 260 odd miles to Washington. The truck was delivered to a branch of the owners in New York and driven by W. J. Schottman of the American Tobacco Co. to the shipping point.

But a Baltimore branch factory needed tin foil, another embargo, so we loaded the truck with 75 cases of the same, weighing 120 pounds each, or 9000 pounds, and went on our way. The load proved to be an old man of the sea before we struck Wilmington.

This story was written with the hope that it may be of some help, as well as interest, to truck owners who contemplate extending the radius of their service, as it may appeal as well to shippers who by reason of the

instructions received from a General Vehicle inspector who rode from New York to Perth Amboy with him. We reached Perth Amboy about 1:20 p. m., received a boost of 220 amperes at a private garage, and went through to New Brunswick, N. J., 37 miles from New York, in a heavy rain storm that evening. Charged at Johnson & Johnson's garage that night, left at 10:30 a. m. and crawled into Brock's garage at Trenton about 6 p. m. Odometer, 61.8 miles.

To go back a little, about one hour out of New Brunswick on the Cranberry pike, we struck our first bad spot, and with 17 others were blocked $2\frac{1}{2}$ hours. The frost had released a spring under the break of the hill and the road was

route from Philadelphia to New York City was finally unloaded by its own and other impatient crews and pulled out backwards by a five-tonner also working in reverse, but the former's front wheels being cut sharp while deep in the mud, the truck ran over its own load, grinding cases of Whitman's chocolates, cut glass and similar dainties deep into the mud. The road was again blocked until the three-tonner could be reloaded, for trucks Philadelphia bound had crowded into the one channel, now made safe by fence rails thrown in the ruts.

The next half hour was full of a number of things. One of the trucks retarded was a great brute loaded with six sections of anchor chain with huge shackles, evidently for crane work. We overtook it two miles further on and found this truck had dropped two lengths through the gate, and as the chains weighed 1200 pounds each, the only way they could be put back was to warp a line from another truck across the steel body and tow them into place. An-



Overland with an Electric Truck: Above, Five Miles Beyond New Brunswick, N. J., a Main Driving Shaft of a Machine Broke in This Hole and We Were Delayed $2\frac{1}{2}$ Hours with 17 Other Trucks; Lower Left, Coming into Trenton, a Big Truck Blocked the Way for 20 Machines and We Lost Three Hours Here; Lower Right, Near the Delaware River Bridge, Trenton, N. J.

railroad situation are confronted with the problems of intra-state hauling on definite schedules, regardless of comparative cost of steam and gasoline. The deductions may not apply to conditions in New England or the Middle West, but they are the result of eye witness studies over hundreds of miles and can be checked by scores of drivers. Indeed, it was largely to help others visualize the driver's problem that the article was prepared.

Log Shows Interesting Details.

The truck left 10th avenue and 22nd street, New York City, in time to catch the 11:30 boat to Staten Island on March 14. The driver, while an expert gasoline truck operator, had never sat at the wheel of an electric until the morning we left, and his coaching was limited to

almost impassable. One truck had clutch trouble, many were mired, another a broken driving shaft, and we had to all pitch in and help clear a narrow thoroughfare. One truck had been 16 hours in the ditch when we passed.

Left Trenton the next morning at 7 o'clock and struck trouble on the first hill beyond Delaware river bridge. A big truck had run into a bad rut in the dark and blocked the road for over 20 others. We lost nearly three hours here, but were able because of our full battery and better motive power to straddle or negotiate the ruts and also to push clear another truck, the rear housing of which dragged on the ridge, preventing traction.

The truck which ran off the road en

other tieup, since the Lincoln Highway there was quite narrow.

Later we were to have our own troubles because we unknowingly ran $2\frac{1}{4}$ miles by the Tioga station of the Philadelphia Electric Co. and had the humiliation of a short tow into the Lafayette Garage in North Philadelphia (4:30 p. m.) over a smooth boulevard. One passing driver in perfect faith offered to loan us gas, but we pleaded a bad clutch.

All Monday Going 24 Miles.

The stay in Philadelphia and Chester was brief, except for some minor charging troubles, and we made Wilmington (152 miles) over some awful hills early Sunday night, charging at the power plant of the Wilmington Traction Co. Away early Monday morning and then to

quote the driver, "we did hit some going."

The current draw of our big truck with its 9000 pounds load should average nine amperes per mile on the usual city

give us any current before midnight. That night we retired at 1:30 a. m. in a private house, the hotels being full.

While we were sleeping trouble developed at the power station and not wishing to longer delay the tin foil, now overdue, we transferred the same to a Baltimore truck at noon and went through via Belleair to Baltimore light, as our current would not have been sufficient for both truck and load. (Odometer 225.2.) Got a good charge at the central station there and next morning left for Washington, 38 miles, reaching there without boost at 4:30 p. m. (Odometer 264.4 miles.)

Counting waits and a day lost at

going bad under heavy traffic. It should be mentioned that less than 10 per cent. of through going trucks were tackling the roads of Delaware or Maryland at night, also that army trucks (averaging three tons) in trains of from three to 80, were making runs daily over many of the sections traveled and that other trucks are regularly making Washington-Baltimore, Baltimore-Philadelphia, Philadelphia-New York runs, very heavily loaded.

In making such commercial runs the first thing needed is a good truck in good condition, the next a resourceful driver and the next good auxiliary equipment. One of the veteran Baltimore drivers who with his two husky negro helpers frequently covers from 600 to 700 miles weekly, and who was eight days going 54 miles last winter, gave us this list as comprising his recommended road equipment and he then carried most of it:

One 30-foot steel towing rope or chain.
One pick.
One axe.
Two shovels.
One saw.
Three planks.
Two chalk bits.

Two lanterns.
Two hydraulic jacks (one small).
One rear tire.
One wheel puller.
Four spark plugs.
Two valve springs.
Two valve spring washers and keys.
24 cotter pins.
One set magneto distributor contacts.
One set extra lamps.
One real tool kit.
Spring bolts and clips.

In other words, he carries during the winter months and in bad weather, fall and spring, about



At the Delaware River Bridge: Delayed Three Hours in Quicksand; Some Trucks Were Three Days in These Ruts.

streets, but from Wilmington to Newark, Del., certainly little over 12 miles, we consumed 240 amperes, or 20 per mile. In our opinion two miles per gallon of gasoline would be good work for a five-tonner on this stretch. We now had to look for a boost, but as most of the nearest hydro plants had gone

down river with the dam in February, we were obliged to call upon Delaware College for help. We ran our cable through a window and wired to a small generator in the electrical school, and were grateful when we got 20 amperes. Instead of getting 100 amperes in an hour as we should we were six hours getting 120. Left at 5 p. m. and made North East, 11 miles further, about 7 p. m.

Charging Under Difficulties

Here we attempted to get more current for we had consumed about all we had taken in at Newark, but were unable to get an input of more than 10 amperes. A five-ton electric was a curiosity to everyone and particularly to a garage man equipped only for rejuvenating small starting and lighting batteries. We would have been 30 hours in all getting a full charge at this town, so early next morning, still shy normal power, we set out for Havre de Grace. We made the 11 miles before noon, but not without help on two bad places, and struck a real stone wall at the local power station, for they were testing turbines and could not

Havre de Grace, it will be seen that over a week was consumed in making less than 300 miles, not a creditable showing for even a five-ton electric unless one remembers that such work is outside its economic field and in addition the total absence of adequate charging facilities for 73 miles. The experience, however, was priceless as showing the current draw under long continued abnormal conditions, the performance of gasoline trucks under like conditions and the underlying causes of fair roads



The Loaded Truck Coming Into North Philadelphia, Where the Paving Was Hard and the Going Smooth.



How the Road Was Cut Into Deep Ruts in Which a Loaded Truck Was Anchored by Its Load if the Ground Was Wet.

the same extra equipment one would send with a lone truck into the interior of Cuba.

We, in our blissful ignorance, and because the truck was expected to go light to join a fleet in Durham, opened the ball with one green driver, two small wrenches, one screw driver, one can of grease, one charging plug and cable, one short towing rope and a 4½-ton load. We had no lantern, no jack, no ammeter, or no tools necessary to even remove a chain. When we needed light to back our way out of a hole at night we had to build a fire for illumination, which we did twice in Delaware.

Our battery was rated at 298 amperes capacity. Within a week we had taken 390 out of it and in Baltimore the meter showed an intake of 420 before full charge. Neither motor nor battery was at any time heated and we encountered all the extremes in amperages and voltages, as well as heavy grades and deep mud and gravel. The trip revealed unexpected performance qualities in the electric, about which it would hardly be



Getting a Tow Under Difficulties: Before the Truck in the Foreground Could Get Towing Traction It Was 60 Feet Away, and a Heavy Cable Was Necessary.

Nor does a road have to be soft to go wrong once the asphalt shell is broken. Twelve tons will find bottom, churning up the broken stone until some unfortunate driver has to reverse and go for

the crust at the bottom of a rise to get stuck good and plenty in the hole he has made when bringing back two tons more than his rating, and the man who loads him this way should smoke on this.

The roads in Maryland about which there is so much pother are a mixture of the superlative and atrocious. When one considers that a truck will take as much out of its transmission in half an hour straining in a soft spot as it will in a solid year's work on good roads, the truck owner might in some cases well sue the county rather than be taxed off the earth. As for some of the detours, drivers going through earlier in March passed deserted carriages where the owners had taken out the horses and walked home.

Foresight Necessary to Efficiency.

Inter-state trucking is here to stay, even should the railroad situation improve. It may slacken off in the winter months, but it offers too many advantages, especially over less than car load lot delays to be discarded. When the return load idea has been worked out there will be thousands of crews (usually three men) making their daily schedules between given points. If some bonus system can be worked out for more careful operation and care, truck mortality



The Charging Station at Havre de Grace, Md., Where Trouble Prevented Getting a Full Charge of the Battery and Necessitated Unloading.

fair to speak in a "neutral" article, just as it showed the phenomenal staying powers of many gasoline trucks under abnormal strains.

It may be only fair to concede that the majority of state roads were not designed for trains of five-ton high speed trucks carrying from six to seven ton loads, but a careful inspection of practically everything but the heavy concrete road will show faulty construction at critical points. At least we found this to be true. Springs find a vent very often at the base or just under the brow of a hill and fully 40 per cent. of the bad places we encountered outside of swamp lands revealed a water vent or seep just where the truck going down hill would drop its 10 or more tons full on the weak spot. In a short time the surface is broken at that point, a truck is stuck going up, others get mired going around it and later the spot is a schedule graveyard for scores. If these places were properly drained before the base were laid down, whether seep is indicated or not, the frost could have less reason to centre there. As for properly draining and filling a hole before frost, it is the old case of one stitch saving nine.

ward intermittently to get out at all, and, of course, the spot is soon practically impassable for loaded trucks, even in dry weather. It were only poetic justice for the chap going back for a load at 15 miles per hour and bumping through



The Truck in Service at Durham, N. C., Hauling Hogsheads of Tobacco to Make "Makin'" for the "Boys Over There."

will lessen and the movement attract the best caliber of a certain class of drivers to whom the long trips appeal.

If the truck owner wants the greatest efficiency from his truck let him or his traffic manager or dispatcher make the run on the truck over the proposed route. Let him see for himself the road conditions which must be encountered, the penalty of no governor, or for hauling 50 per cent. overload. One mile per gallon with a 3½-ton chassis in some parts of Pennsylvania was not unusual last winter in the heavy drifts. Ten miles per day is good work over the clay roads of some states in the spring and fall, and with half a load. There are cases where time is everything if the truck lasts but three months, but it is unfair to both driver and truck to expect high speed, overload and low depreciation on any class of roads.

The driver and crew of a truck covering various routes across several states are often 12 hours without food. They sleep in everything from a cold garage to a Polish boarding house. Going without sleep for 36 hours is not unusual, when they must wrestle with a sink hole all night, and said holes are often miles from even a farm house. Many bridges are washed away, others are being repaired or rebuilt. Toll gate charges often run to \$3.50 per truck each.

In other words, foresight and first hand knowledge are necessary to efficiency in long haul trucking just as in city work, and no man having money invested in equipment is too big to give the matter thoughtful attention if he wants dividends.

LIBERTY LOAN BULLETIN.

The National Automobile Chamber of Commerce has issued a special bulletin to the automobile industry, which is entitled "A Plan to Assist Your Company in Making the Third Liberty Loan a Big Success Among Your Own Employees." This is a folder that has a very practical suggestion for cooperative work to obtain subscriptions for bonds of small denominations, and outlines a method that has proven very successful in practice.

PEERLESS DEALERS ORGANIZE.

The Peerless car and truck dealers of New England have formed a permanent organization and have elected as president J. Walter Norcross of Springfield, the head of the Norcross-Cameron Co. of that city.

George McIntyre, sales manager of the Commonwealth Finance Corporation, 100 Broadway, New York City, will retire from that position May 1. He has made no statement as to his future plans.

The Bronx Automobile Dealers' Association, New York City, has elected Homer Waltermire, agent for Gramm-Bernstein, Collier and Commerce trucks in Bronx Borough, its president.

Boulden Is Selden Vice-President

A series of promotions in the offices of the Selden Truck Sales Co., Rochester, N. Y., has been announced by President George C. Gordon, with the statement that the advancements to the new officers are due to the loyalty and untiring efforts of those holding them in the interests of the company. The offices were filled at a meeting of the board of directors as follows:

President, George C. Gordon; first vice president, in charge of production, William C. Barry; second vice president, in charge of government business and foreign sales, Robert H. Salmons, formerly secretary; third vice president, director of foreign sales and dealers, Wilbur F. Reynolds, formerly export manager; fourth vice president, Hal T. Boulden, director of sales and advertising.



Hal T. Boulden, Fourth Vice President and Director of Sales and Advertising, Selden Motor Sales Co.

ing, formerly sales director; secretary and treasurer, Edwin B. Osborn, formerly assistant treasurer; advertising counsel, C. Henry Mason; assistant sales manager, Charles E. Williams.

Hal T. Boulden, fourth vice president, was formerly associated with the Chase Motor Truck Co., Syracuse, N. Y., and went to the company as sales manager. Later he was made sales director and now has received his third promotion with the company.

The stockholders have authorized the increase of capital to \$750,000, which expansion was necessitated by the extremely large demands for Selden machines. The completion of the new factory of the company will add considerably to its production.

The plant of the Ford Motor Co., Detroit, is producing about 2000 cylinders a day for Liberty motors, according to statements originating in Washington, D. C.

MOTOR TRUCK SHOWS.

The sentiment of the industry is undeniably favorable to exclusive exhibition of power trucks, which has been stimulated to a considerable degree by the fact that shows of this character held in several sections of the country, and some of them supplemental to automobile exhibitions, have been very largely attended. There is good reason to believe that those visiting truck shows are considering the purchase of machines, and have desire to make comparison of the exhibits with a view of concluding what will best serve their purposes.

So far as shows are concerned decisions cannot be reached immediately, and the conditions may be changed materially in a short time, but there appears to be substantial basis for the assumption that truck shows will be productive of purchasing and can be participated in by manufacturers and agents with expectation of doing considerable business.

Because of the curtailment of production of passenger cars and the probable economies resultant from the war, a period of lessened activity for car dealers appears probable, but the demand for trucks is very large and there is no assurance that the output of the industry will be adequate to meet this.

NEW KISSELKAR AGENCIES.

J. S. Wintermute, Newark, N. J.; Waterloo Boy Kerosene Tractor Co., Sidney, Neb.; G. P. Gephart, Ponca City, Okla.; R. E. Sperry, Fairfax, Okla.; Doklins & Rorex, Henryetta, Okla.; Enid KisselKar Co., Enid, Okla.; Slaughter Motor Car Co., Ardmore, Okla.; Hill Top Garage, Monessen, Pa.; Gibson-Carlton Motor Co., Pontiac, Ill., and the Yaddin Motor and Machine Co., Salisbury, N. C., have made agency contracts with the Kissel Motor Car Co., Hartford, Wis., for the sale of cars and trucks.

KEROSENE EQUIPMENT CO.

The Detroit Kerosene Carburetor Co. has been taken over by the Kerosene Equipment Co., Detroit, and a factory will be established to manufacture kerosene carburetors and other appliances. The president and treasurer is E. E. Schwarzkopf, and J. W. Racklyest, formerly of the Detroit Kerosene Carburetor Co., is vice president. The new company has capital of \$50,000 and against this has issued common stock of no par value.

The Fallor-Martin Co., New York City distributor for the King Trailer Co., has issued some novel and interesting literature descriptive of the economic qualities of King semi-trailers.

The Sanford Motor Truck Co., Syracuse, N. Y., has announced the appointment of F. C. Brown as sales and advertising manager, which became effective April 10.

MAINTAINING THE THROUGH ROUTES

Practical Possibilities for Keeping Main Highways Passable for Motor Traffic, or Improving Them with Least Movement of Supplies

By PHILIP P. SHARPLES.

THE past year has seen demands made on such through highway routes as the Lincoln Highway that were not even dreamed of a few years ago. The war, in regard to roads, as in regard to many another 20th century problem, had bridged in a few months and with finally a period which under ordinary circumstances would have lengthened out into years.

The great through routes have become bearers of traffic. Those with provision have been looking forward to the time

tory in regard to costs and much quicker in regard to time.

Perhaps it would not be rash to predict that even with the return of railroad traffic to normal conditions the motor truck will never be driven out of the short haul business, since it has proved so satisfactory from a service standpoint and that there will always be enough special business to keep trucks on the long through routes.

Has Brought New Problems.

In the meantime the new transporta-

tion has brought new problems. Instead of a few miles around each city to be kept in condition for auto-truck travel, all the through routes, embracing thousands of miles of road through lowland, through upland, through valleys and over mountains must be so maintained that the auto-truck can do its bit for the country.

Road Construction and Maintenance.

The same spirit is manifest in taking up the problems of construction and maintenance. No chain is stronger than its weakest link, and no through route is more passable than its worst section. Bad roads along Lake Erie have driven traffic best routed through the Mohawk valley south over the Lincoln Highway, while the Lincoln Highway itself has bad spots in Indiana and Illinois that greatly restrict its usefulness. Federal aid is being directed to these weak spots and already plans are under way to fill in the missing links through the cooperation of national, state and local authorities.

Manifestly, speed is all desirable, and types of road like the penetration macadam are being chosen which may be built with local materials and the least possible movement of supplies over the railroads. The merits of this type of road where speed of construction was of primary importance were thoroughly demonstrated in the cantonment work. In a number of instances roads of this



National Pike Crossing the Green Ridge Mountains at Piney Grove, Md.; a Macadam Road Kept Good by Surface Treatments of Bitumen and the Patrol System.

when the old routes would again take up their function of carrying freight. The pleasure seeker has shown the way. The old National Pike through Maryland has been revived from end to end; the old William Penn Highway is a scenic route; the Lincoln Highway has budded forth to meet the same demand, and yet in their entirety no one had looked upon them as carriers of freight.

How the Traffic Increased.

The movement of freight began last year with the blocking of the railroads. At first it was tentative. Trucks were dispatched on special missions. Perhaps some part of a machine must be bad regardless of cost; perhaps it was the truck itself that must be delivered. However it came about the trucks showed that they could go through, that they could cover 1000 miles straightaway as easily as 1000 miles running errands around city streets. The costs were found to work out about as expected, much too costly per ton mile to compete with the railroad in normal times for long distances, but for shorter hauls, where it meant the elimination of much loading and unloading, entirely satisfac-



National Pike West of Frontburg, Md. Practically All of This Highway and Its Branch, the Frederick Pike, Are Maintained with Refined Tar by a Patrol System.

tion has brought new problems. Instead of a few miles around each city to be kept in condition for auto-truck travel, all the through routes, embracing thousands of miles of road through lowland, through upland, through valleys and over mountains must be so maintained that the auto-truck can do its bit for the country.

Road authorities, national, state, county and town, are recognizing their responsibilities and displaying a most

type were turned out at a speed that would have put to shame the builder of ordinary gravel roads. And they were good roads, as has been demonstrated this past winter. Camps that had tar macadam roads had places to drill upon and roads for delivery of supplies, for auto-trucks, good for any weather. Some of the other camps where traffic was absolutely stopped by the mud heard with envy of their more fortunate fellows.

Coupled with the filling in of the miss-



The Lincoln Highway at Ray's Hill, Bedford County, Pa. A Mountain Road That Is Kept in Condition for Auto Truck Traffic with Tar via B.

ing links is the maintenance of the roads already built and now carrying the constantly augmenting auto-truck traffic. The problem has been met hitherto by the state highway departments with an ever increasing understanding of the problems involved and their best solution. The immense increase in through auto-truck traffic to be expected under existing conditions is going to make even more difficult than hitherto the task of upkeep of these long stretches of road.

Where previously the engineer looked forward to preparing his roads to resist a stream of passenger vehicles through the summer, he must now prepare to make his roads stand the strain of a fleet of auto-trucks continuing through the winter, or at best beginning as soon as the worst section of the road allows the passage of the first auto-truck.

How to meet this situation is by no means an easy problem. Many a road, built reasonably well and thought by previous experience to be proof against a spring thaw is being forced out of shape this spring by the new traffic. From an engineering standpoint, a stronger type of road is desirable, but it is manifestly impossible under present conditions to reconstruct any considerable mileage of these old macadam roads by resurfacing with a bituminous top.

They must be kept along as they are, however desirable it might appear to change their character.

Poor Drainage Cause of Defects.

It will be found as the spring ad-

these weak spots and determine the cause of the trouble. Usually it will be found in the drainage. Perhaps a new culvert is called for, or it may be an underdraining of the sections with a V drain or tile will remedy the evil.

After the frost has gone the surface must be carefully patched. For this purpose nothing has been discovered better than the new bituminous patching materials which are used cold. They are the patrolman's cure-all for troubles in macadam surfaces maintained by modern bituminous surface treatments. Properly used, with the right sizes of stone, any hole, no matter how large or bow discouraging, can be patched in to match the original surface.

Under the new traffic the patching must be continued through the season. The patrol system has been found the most effective method of doing this work. A section of road, usually about five miles, is assigned to some man to look out for. He has a horse and wagon, piles of stone and cold patch material to work with. He keeps the drainage clear, he cleans up the road, he keeps the surface



The Lincoln Highway at Jnasaita Crossing, Bedford County, Pa. A Level Stretch of Magnificent River Road Treated and Kept Repaired with Tar via B.

vances and the foundations of the roads dry out, that many of the flaws heal themselves with a little kindly assistance from the patrolman. The spring softening is an opportune time to mark

perfect with patching. He is trained in his duties by the division engineer, and his presence is made known to the layman by the label on his cart or by a flag stuck in the road nearby his work. He holds the key to good roads and should be honored accordingly by every passer by.

All Roads Must Be Patched.

The spring patching is not confined to the macadam road, but all the hard surface roads, the bituminous macadam and the concrete must be conscientiously repaired, either with cold patching or with hot patching.

The surface treatment of the macadam road becomes even more important with the auto-truck traffic than with the usual traffic. New problems are presented. No shifting mat can be allowed for the heavy trucks are sure to disintegrate the mat or cause it to roll and rut. The cold surface treatments of refined tar will be found preferable to the more expensive hot treatments. The cold treatments sink into the road and become a part of it, strengthening the crust and making



The Lincoln Highway Near Schellburg, Bedford County, Pa. A Mountainous Section That Is Maintained by Patrols and Cold Applications of Refined Tar.

it better able to withstand the loads put upon it. These coatings, too, may be renewed indefinitely without forming a rolling mat.

Such through lines as the National Pike through Maryland, the Lincoln Highway in Pennsylvania and the William Penn Highway have already had

routes are elements of weakness. It is a lamentable fact that on some of the most desirable routes the bridges of the so-called tin variety are so woefully lacking in strength that only the lightest of trucks may be used. In some states the highway bridges are still administered by the towns, although the roads are

five-ton truck to pass with an ample factor of safety. Our forefathers planned better on the old National road in Maryland. The bridges have stood for a century and are still capable of sustaining any load likely to be imposed upon them.

The bridge problem, like the road problem, requires cooperation for its solution. Let everyone recognize the importance of the problems and then let everyone work together for their solution. The end to be aimed at is good roads, everywhere passable the year through for all classes of vehicles.

WANTS DRIVERS LICENSED.

Commissioner of Motor Vehicles William T. Dill of New Jersey is urging upon New York state officials and legislators the necessity of that state adopting provisions similar to those of New Jersey, which requires that drivers be examined to determine their physical fitness for driving and that they demonstrate their driving ability before being licensed. A written application and a \$1 bill mailed to the secretary of state will license any driver in New York state.

Commissioner Dill maintains that the only manner that accidents can be obviated is by preventing reckless and incompetent men from driving. In this stand he has the approval of New York court judges. Better control of these driving power vehicles is the only means of safeguarding the public. The New Jersey law is similar to that of Massachusetts, and



William Penn Highway (Pennsylvania State Road) Near Collegeville, Pa. A Macadam Road of Old Construction Protected from Traffic Wear with Refined Tar.

several years' treatment by this method and are holding up under the traffic.

Sections of gravel roads, if sufficiently good, may be treated by similar methods. There are still some sections of soil and dirt roads. Until those can be replaced by macadam or bituminous macadam, they must be maintained along well developed lines. The road scraper for spring work and the road drag intelligently used through the season are the main reliance. Used by intelligent patrolmen it is possible to keep these roads passable except through the wettest weather.

Problem Not New or Difficult.

So much for the road surfaces. The problem is not new, it is not difficult. A careful carrying out of methods already well developed is all that is necessary. The cost is going to be much greater. Not only is the wear and tear greater, but the enhanced cost of materials, the greater cost and lessened efficiency of labor are going to make the work more expensive. These costs are very material additions to the ton mile costs of running auto-trucks, but as they are absorbed in the general tax levy, little thought is generally given to them.

The bridges on some of the through



Camp Devens, Ayer, Mass. A Section of Camp Road, Many Miles of Which Were Built Last Fall in 90 Days with Refined Tar, on Which Auto Trucks Were Used All Winter.



Lincoln Highway Near Langhorne, Pa. The Snow Was Plowed Off to Facilitate Traffic with Auto Trucks—The Fleet Shown Was Carrying Felt from Elizabeth, N. J., to Marcus Hook to Keep the Congoleum Factory Operating.

taken over by the state. This may mean that some poor town that cannot afford anything different holds up the traffic of the state. The answer is patent: The bridges on the trunk lines should be owned by the state, and no bridge should be permitted which will not sustain a 15-ton road roller. This would permit any

suspension or revocation of license is a penalty for all who do not observe the requirements of the statute.

The Davis Service Station, Buffalo, N. Y., has taken the sale and service of Flechter carburetors for that city and vicinity.

Truck and Trailer Economies In Logging

The value of lumber has so increased that timber that had not been regarded as worth attention of lumbering companies is now sought and cut, this even applying to sections of the country where there are large forests. As a rule the larger the timber the more valuable it is, but handling is a very large factor of expense. Until recently only timber that was close to railroads or streams, down which it could be floated to mills, could be cut and manufactured. Each year the work of getting logs to railroads or streams has become more costly. Some lumbering concerns have operated with industrial railroads, and while these can be extended they are limited as to trackage and equipment without the investment of considerable amounts annually, and paths must be made to haul the logs to them.

Road construction in forests for timber haulage has never been considered, even with the increased prices obtainable for lumber. After cutting the roads have no value, for the land is seldom, if ever, cultivated, and any construction that cannot be moved is practically a total loss. The Curtis & Russell Logging Co., Chehalis, Wash., is operating to a new plan that is maintained to be profitable, but the profits depend entirely upon the equipment utilized and the efficiency of the crews working.

The company specializes buying and cutting timber. It has no forest land on which cutting can be carried on, but its men seek farmers and ranchers, who have from two to three to 50 trees, buy the timber standing and arrange to cut it. The trees may be in almost inaccessible places, or where they can be easily reached. The company has an outfit consisting of Federal truck and semi-trailer, a portable donkey hoisting engine, and tackle and tools for handline logs of all sizes. If the timber can be reached by roads the cost of logging is small, but if there are no paths the expense is greater.

The trees are felled by sawing, trimmed and cut to lengths that can be handled, and then temporary derricks are built of one or more poles and wire cable, with which the logs can be drawn about and lifted. Logs are used for skids and with the hoisting engine the valuable timber can be loaded on the semi-trailer. There are instances where the haulage over rough ground is for considerable distances. With the truck and trailer large loads can be carried and with the entire outfit a comparatively small crew can do a good deal of work. The company can haul about 18,000 feet a day, and it estimates that the truck and trailer earns about \$75 a day. The plan of operation saves time, labor and money, and it also increases the supply of lumber, for it brings into the market timber that was not previously cut because of the limited number of trees and the cost of cutting and handling it.

MYERS BACK IN BOSTON.

Henry H. Myers, for three years manager of the truck sales department of Studebaker Corporation, and prior to that time manager for the New England branch at Boston, has returned to Boston to take charge of the business of this department of the company until a successor has been named for George N. Jordan, who resigned as branch manager. Mr. Myers will continue to serve as manager of the truck sales department and as soon as he can be released will devote his entire attention to it.

WHITTAKER JOINS ACASON.

The Acason Motor Truck Co., Detroit, has appointed Donald F. Whittaker advertising manager. He was formerly assistant advertising manager of the Federal Motor Truck Co., and was engaged in sales promotion as part of his duties, and later was made sales manager of the Detroit Truck Co. He is widely known in the industry and trade.

The McNaul Tire Co., Toledo, O., has appointed Horman O. Leppig, formerly connected with the Falis Rubber Co., as Pittsburgh, Pa., representative, sales manager for the central district.

New U. S. Tire Plant at Providence

The United States Tire Co., which has tire factories at Hartford, Indianapolis, Detroit and Providence, has acquired the plant erected and utilized by the American Locomotive Co. at Providence for the manufacture of Alco cars and trucks, and which was later utilized for the manufacture of war munitions.

The buildings are large and admirably constructed, with every facility for manufacturing. The floor area is 245,848 square feet, and it is erected on a tract of 10 acres of land, fronting on the Woonasquatucket river and reached by a siding from the yard of the New Haven railroad. It has a large foundry and a splendid power plant. The property adjoins that of the Revere Rubber Co. and this practically unites the United States interests in Providence.

The Alco factory will be operated under the direction of H. W. Walte, superintendent of the Revere works. The Revere plant has for a considerable period produced United States solid tires and the intention is to operate the Alco division for solid truck tire making, as well as the manufacture of cord pneumatic tires for trucks. The statement is made that it will also be used in part for the manufacture of rubberized fabric for balloons, aeroplanes and other aircraft.

According to statements generally given credence the company will employ about 3000 hands and the production will add about \$20,000,000 to the gross business annually. The initial expenditure for the property was about \$500,000, but the cost will be considerably increased by extensive alterations that are now being made prior to installing machinery.

Gould Allen on April 1 retired as sales manager for Fuller & Sons Manufacturing Co., Kalamazoo, Mich., to manage the office of the Wetzel-Hall Co. at Detroit. Mr. Allen was formerly secretary of the Harrison Radiator Co., Lockport, N. Y., and for five years was sales manager for the Covert Motor Vehicle Co. and the Covert Gear Co. of Lockport.



Cutting Isolated Timber: At Left, Loading a Truck and Semi-Trailer with Heavy Logs at Portable Plant; at Right, a Load of Valuable Logs That Would Be Worthless if Other Means of Cutting and Haulage Were Employed.

GERMAN FIELD DUTY AMBULANCES

By Frank C. Perkins.



Ambulance for General Purposes in Army Service, But Not Well Suited for Use Close to the Battle Line.

AMBULANCES are absolute necessities of warfare. Because of the destructiveness of artillery and machine guns, to say nothing of the uses of gas and fire or close range weapons of all kinds, the casualties of skirmish and battle are frequently a considerable percentage of forces engaged. First aid is usually administered on the firing line, and then the injured are removed to field hospitals and later to base hospitals. The wounded can only be conveyed in vehicles, and speed is vitally essential. Almost any form of automobile in which men can be carried will serve a useful purpose, but as the fighting is without reference to topography or roads, and much of the driving is on rough ground, chassis designed for ambulance service are constructed to minimize the effect of jolts and shocks upon the occupants of the seats and stretchers.

The German army makes use of many types of ambulances, a considerable number of which have been designed and developed since the invasion of Belgium

Fast Light Ambulance.

The length of the chassis is 11 feet 10 inches and the width of body over the wheels is four feet seven inches. The machine has an engine producing from 38 to 48 horsepower. The carrying capacity is fixed at 1500 pounds and the speed is from 30 to 35 kilometers (18½ to 22 miles) an hour.

The frame is of pressed steel and the steering connections and levers, as also the axles, are made from high-resistance steel, in order to render them proof against shocks, due to jolting over bad roads. The springs are of high-elasticity spring steel and the light vehicles are fitted with pneumatic tires and are equipped with wood wheels with detachable rims. The design of the engine is such that all important parts are easily accessible. The cylinders are cast in pairs.

It is pointed out that the valves are of nickel steel and are located one above the other, so that the cool, inrushing gases effectually cool the exhaust valves

and prevent the premature burning of the latter. The connecting rods are of pressed steel and like the pistons, while very light, are of great strength. The crankshaft is made of chrome nickel steel and is supported on three bearings. Every effort was made to reduce wear to a minimum and to secure long life of the various parts by the employment of maximum resistance material.

It is of interest to note that the carburetor is a special design adapted to work equally well with gasoline, heavy spirit or benzol. It is economical as regards consumption and renders the engine extremely flexible. The throttle is controlled both by a lever on the steering wheel and by a foot accelerator. The heavy vehicles are also fitted with automatic governors, which prevent the maximum speed of the engines being exceeded. The current for the ignition is furnished by a magneto and the spark formed in the cylinders by high-tension spark plugs. The magneto and the plugs can readily be detached.

Two Methods of Engine Cooling.

It may be stated that for cooling, the water circulation, except in the heavy vehicles, in which a pump is employed, is the thermo-syphon system. A belt driven fan is provided to draw a strong current of air through the radiator. The fan belt can be easily adjusted. The engine is automatically lubricated by means of a small pump, which draws the oil from the lower part of the crank chamber and forces it through a filter to the oil reservoir. The latter is provided with a small glass window so that the level of the oil is always visible to the driver. From the reservoir the oil passes under adjustable pressure along suitable piping to the different parts of the engine requiring lubrication. A liberal supply of oil is given to the bearings; at the same time the lubrication is economical as regards consumption and smokeless.



Ambulance Designed for Field Duty, Having Capacity for Four Patients, with Four Stretchers Mounted on Full-Elliptic Springs and Rollers. Above, a Stretcher Bottom Up to Show Its General Construction.

was begun. These range from what may be regarded as meeting every possible requirement for state or municipal use to those that are extremely simple and are intended for war conditions only. Of these, that shown in the first illustration, which was built by the Automobilfabrik E. Nacke-Coswig-Sachsen, is probably representative of the type that may be approved for general purposes when nations are at peace.

It may be mentioned that the clutch is of the well tried leather faced cone type, the design being such that there is no slipping of the leather facing. The clutch shaft is provided with a coupling, which prevents any hindering effect on the engine or transmission by temporary distortion of the frame, due to rough roads.

On this German motor ambulance the gear box is supported in the frame at three points, so that it is unaffected by any temporary distortion of the frame. The different speeds are controlled by a lever working in a gate at the right of the driver. All shafts of the gear box run on ball bearings. On the top speed the drive is direct to the gear on the back axle, or to the intermedial differential shaft, according to the type of vehicle. The gear wheels are of chrome nickel steel.

Positive Means of Control.

It is maintained that the steering gear is of the screw and nut type. The steering wheel is free from shocks and easily controlled. The steering connections are of best steel and of great strength and the steering joints are of the adjustable ball type, of hardened, chrome nickel steel, and work in hardened steel ball cups. The chain driven vehicles are fitted with two foot brakes on the differential shaft, and two hand-operated internal brakes working on drums connected with the rear road wheels.

It is said that the foot brakes are not located under the chassis at a point difficult to get at, as in most other vehicles, but at the sides of the vehicle, close to the small sprockets on the ends of the differential shaft. The brake shoes are arranged so that they can be readily renewed and easily adjusted by means of a nut.

In the light type vehicles, with cardan shaft transmission, the foot and hand controlled brakes work in large size drums connected with the rear road wheels; they are all of the internal expanding variety. By locating all the brakes on the back wheels the danger of cardan shaft vehicles skidding when the brakes are suddenly applied is reduced. In addition to the above mentioned brakes these motor ambulances are provided with an arrangement which enables the engine to act as a brake, by shutting off the gas supply, and opening a cold, fresh air inlet, this being controlled by the simple movement of the throttle lever on the steering wheel. This air brake has been proved a success in practice and is sufficient to brake the vehicle on all ordinary hills.

The gasoline tank is provided with a safety device which renders it inexplorable. In the larger types of vehicles it is located under the driver's seat, and in the lighter vehicles either under the seat or behind the gear box, below the chassis.

Practical Body Equipment.

The body equipment of the simpler type—that constructed expressly for field service, is shown in the second illustration. This is practically a standard chassis, on which is installed a permanent cover or top extending back from the driver's seat. This top is supported

by three rows of steel stanchions, one at either side and in the centre, the sides and rear being open, but these can be enclosed by curtains that are permanently secured to the roof and may be rolled or lowered. On the sides directly back of the seats are two narrow vertical side panels extending from the roof to the low side panels that form the base for and strengthen and stiffen the top frame. The vertical panels are doors through which there is access to the front end of the body. Under these are smaller doors, through which compartments for medical supplies are reached.

On the front of the body is a folding fabric top that is practically a bonnet, this extending forward over the windshield. This top may be folded or open and can be handled quickly by one man in the event of storm. At the rear there is a horizontal gate or door, hinged at the bottom, that may be lowered, and below this, carried on heavy brackets, is a folding step, which is used chiefly for placing the stretchers in or taking them from the ambulance.

On the sides of the centre stanchion and the insides of the side stanchions, as may be noted in the illustration, are channelled steel rails that serve as braces and as supports for the upper tier of stretchers. The ambulance has capacity for four of these stretchers. They are constructed of steel frames to which fabric fillers are lashed at the edges and supported by crosses and knotted rope. The fabric may be removed quickly when desired. At the forward end of each frame is a smaller frame that is adjustable for height, that serves as a head rest. Each frame is mounted on four light full elliptic springs and centered under each spring is a small metal roll, carried on a fixed axle.

The stretchers can be drawn from or pushed into the ambulance quickly and easily, and with little effort when raised to the height of the floor or the channels that carry the rolls of the two upper stretchers. The springs are resilient and very well protect the occupants against jolts and shock and the patients can be carried long distance and over rough roads with minimum suffering. Either patient on a side can be reached by the attendants when the curtains are raised, for the running boards are long and extend close to the rear wheels. The ambulance can be used anywhere and is said to be very useful in rough country, for the springing of the stretchers in addition to the regular chassis suspension justifies carrying freights of seriously wounded men who could not be safely carried in the usual type of vehicles.

COOK SUCCEEDS LANE.

M. H. Lane, a well known Michigan manufacturer, has resigned as president and general manager of the Lane Motor Truck Co., Kalamazoo, Mich., and has been succeeded by W. A. Cook of Marion, Ind., who was formerly associated with Indiana Truck Corporation of that city.

ARMY MOTORCYCLES SHIPPED ON TRUCKS.

The first of a series of shipments of motorcycles for army service from the plant of the Hendee Manufacturing Co., Springfield, Mass., was made early in April, when more than 1000 cases of machines, side cars, parts, tires, etc., were sent away on four trains of trucks, each consisting of 30 Pierce-Arrow units, rated at three tons by the service standard, a tank truck, two smaller trucks and an officers' car.

The truck trains were manned by 77 men each and came over the road from Buffalo to Springfield, the men having considerable difficulty in getting through the Berkshire hills east of Albany because of the snow, ice and mud. The trucks in places came through paths dug in six and eight feet of snow and ice. The loading required two and a half days and as soon as a train was freighted it was dispatched for an Atlantic port, the supposition being that the motorcycles were to be shipped abroad immediately.

The trucks were parked at the Eastern Exposition grounds at West Springfield, and the crews were quartered in the arena building. There is reason to believe that future shipments made from the factory will be made overland, the trucks coming to Springfield from the West and loading for the ports where the freights will be delivered. There will be considerable saving in time, for the delivery will be direct from the plant to the piers.

MOTOR TRAFFIC RULES.

W. Eugene Turton addressed the members of the Traffic Club of Newark, N. J., at a meeting held April 2, his subject being "The Importance of the Enforcement of Traffic Rules and Regulations for Motor Traffic," but the principal part of his address was devoted to the need of developing highway transportation as a means of relieving the railroads. He dwelt upon the need of reciprocal state licensing, emphasizing that if this were not granted by the states themselves the importance of road haulage would eventually lead to Federal licenses and the states would be deprived of what is now the source of considerable revenue.

HAVE KOEHLER AGENCIES.

The Overland-Knight Co., Newport News, Va.; Motor Car Co., Baltimore, Md.; O. Syska & Son, Brooklyn, N. Y.; E. L. Meredith, Cambridge, Md., and the Capitol Motor Corporation, Richmond, Va., have been made agents for the sale of Koehler trucks.

The Anderson Electric Specialty Co. will on May 1 occupy a factory at 118-24 South Clinton street, Chicago, in which the production will be increased practically 200 per cent. The company manufactures electric lighting specialties and automobile accessories.

CONTINENTAL MOTOR STAND.

A stand adaptable for all makes, sizes and types of engines is the Continental, built by the Continental Auto Parts Co., Knightstown, Ind., which is suited for the uses of automobile, truck, tractor, aeroplane and engine manufacturers; taxicab and livery companies, or concerns operating fleets of cars or trucks and in garages and service stations.

The stand is portable and with it every part of an engine is accessible. All engines, Ford and three-point suspension types, are positioned as when in the chassis and clamped firmly. They can then be turned and locked in any desired position so that any part may be brought to a reasonable working height. The stand is adjustable in width up to 30 inches, has a five-inch height adjustment and can be locked in 25 different settings. The stand itself is 39 inches high, requires floor space 29 by 36 inches, and when crated for shipping weighs 299 pounds.

This company manufactures a number of specialties, including a creeper, a steam vulcanizer, foot rests for control



Continental Portable Stand, Designed to Take Any Size or Type Engine, Adjustable to Any Position.

of accelerator pedals, and a very efficient running board support for Ford chassis. Catalogue will be sent at request.

CHARLES G. MCKINNEY SERVICE.

The Charles G. McKinney Service was recently established at 123 West Madison street, Chicago, to afford intelligent advertising service to concerns of the motor truck and parts industry. It is in charge of C. C. McKinney, who has been identified with the industry through connection with leading publications devoted to it and he has assisted in the development of several successful truck concerns. He proposes to have close contact with sales and advertising departments, so that both advertising and merchandising will be covered. The McKinney Service will place the advertising of the Clark Equipment Co., Buchanan, Mich., and several other well known industrial interests.

BOSCH MAGNETO PLANT SEIZED.

The plants of the Bosch Magneto Co., at Springfield, Mass., and Plainfield, N. J., have been seized by Alien Property Custodian Palmer, by whom they will be operated, and the production will be turned over to the government for the use of the army and navy departments. Investigation established that the greater part of the stock of the company, which is capitalized for \$75,000 and owns property stated to be valued at \$7,000,000, vested in Robert Bosch and other residents of Germany, although Carl L. Schurz, who succeeded Otto Heine as president when war with Germany was declared, according to a statement made through Mr. Palmer's office, represented that much of the stock of the company had been transferred to American citizens, that he was president and that he and Gustav John were directors. One statement by Francis P. Garvan, director of the Bureau of Investigation, is that the attitude of the company after the United States declared war was such as to indicate plainly that the company was owned by Germans, and the company was loath to afford any service to the government in its preparations for war.

INDEPENDENT MOTORS CO.

The Independent Motor Co., Youngstown, O., has been incorporated with \$300,000 capital and has purchased the Wilson avenue plant of the Miller-Smythe Electric Co., where machinery is being installed and which will probably be in operation in 30 days. The officers are: F. M. Kennedy, president; A. W. Frantz, vice president and general manager; Frank Leish, treasurer, and H. C. Mikkelsen, secretary. With Charles Smythe these officers constitute the board of directors. A. W. Frantz was formerly president and general manager of the Independent Motors Co., Port Huron, Mich., the assets and business of which have been acquired by the new company, which is financed by Youngstown capital. Contracts have been placed for material for a production of 300 trucks the first year, which will be one and two-ton worm driven trucks, which series will probably be added to later. The reorganization of the company and the change was determined when the Port Huron company sold its plant to the Muelier Metals Co., munition manufacturers.

The capital of the Northwestern Chemical Co., Marietta, O., has been increased from \$150,000 to \$500,000 to meet the requirements of increased business and to meet the expense of two large factory buildings, now practically complete. This is the fourth time within two years the company has erected buildings to provide manufacturing space.

A building that will be ready for occupancy June 1 is being erected by the Hawkeye Truck Co., Sloux City, Ia., which will increase the production capacity of the factory from 600 to 800 trucks a year.

WILL BUILD SCHWARTZ TRUCKS.

The Schwartz Motor Truck Co. has been organized at Reading, Penn., to build a series of four trucks, 1½, 2½, 3½ and five tons load capacities. These will be constructed with Continental engines, Brown-Lipe clutches and transmission gearsets, Torbensen internal gear rear axles, Timken front axles, Parish frames, Perfection springs, Ross steering gears, Fedders radiators, Schwarz wheels, Bosch magnetos, Stromberg carburetors and Pierce governors. The first of the two smaller sizes will be ready for delivery about June 1 and as soon as practical the larger sizes will be built.

BROWN SELLS SANFORD TRUCKS.

The Sanford Motor Truck Co., Syracuse, N. Y., announces the appointment of F. C. Brown as sales and advertising manager, who has assumed his duties.



F. C. Brown, Sales and Advertising Manager, Sanford Motor Truck Co.

Mr. Brown was formerly district manager for the Chase Motor Truck Co., Syracuse, and has been identified with the industry for a considerable period, serving with sales and engineering organizations. He is widely known to the truck trade.

NEW UNION CHASSIS PRICE.

Beginning May 1 the list price of the Union model B 5000-pound chassis, with cab and seat, will be \$2375 instead of \$2075, an advance of \$300, and all orders are subject to acceptance by the company. Prices of bodies and special equipment will be advanced in like proportion. The increase is due to the greater cost of labor and material, for quality could not be maintained for the present prices. Statement is made that the new price will be about \$150 less than the cost of the average truck of like capacity.

Contracts for additions to its plant that will cost \$500,000 have been made by the White Co., Cleveland, O.

HYATT ROLLER BEARINGS FOR TRUCKS

Contributed by Advertising Department,
Hyatt Roller Bearing Co.

A BEARING is a means for overcoming friction.

Years ago, before the time of the automobile and the motor truck, the need of such a device was limited. The work which is now performed by trucks was then done with horse drawn wagons. In such conveyances the hub boxing fit-

ducted in a fully equipped physical and chemical laboratory, but a number of them are subjected to the entire heat treatment to insure of the best results achieved in the manufacturing process.

An entire building of six stories, containing approximately 100,000 square feet of floor space, is required to house this one heat treating department. Row after row of great furnaces line the floors. A continual stream of bearing

parts is constantly passing through these furnaces, undergoing the fiery operation which is a part of the process. The intense heat is generated by gas produced in a private plant of immense capacity. The temperature reaches a height of 1500 degrees, and an even temperature is constantly maintained. No greater variation than 20 degrees is ever permitted. It

and the grinding of these bearing parts is an operation of the utmost accuracy. Gauges measuring to the thousandth part of an inch are used in checking the workmanship of this department. A variation one-fifth the thickness of an ordinary piece of paper is instantly detected and immediately corrected. Even the gauges themselves are regularly inspected by the aid of master gauges, and any wear, however infinitesimal it may appear to be, is rectified, so that no irregularity of the product will exist.

An investment of thousands of dollars is represented by these gauges alone. But the accuracy and dependability they assure make their cost a wise investment. The Hyatt company never weighs pennies in its attempt to achieve product perfection.

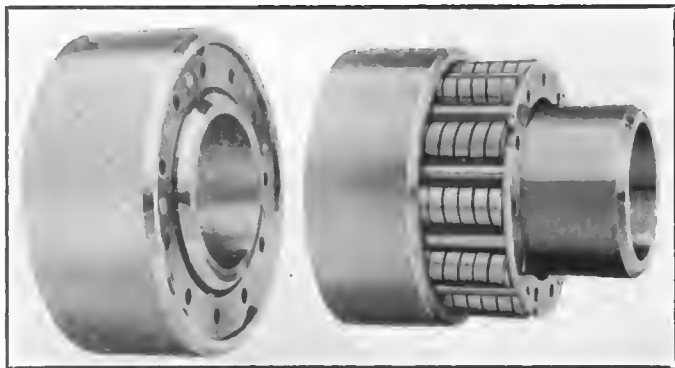
Still other tests follow. Those which have preceded have been tests of individual parts. The faulty ones are discarded and only the flawless are ever assembled into the complete bearing. After the parts are assembled the bearings are again inspected and tested most carefully before they are permitted to go out into the service of the user.

And still the tests continue. Samples of finished bearings are drawn from different lots and subjected to experiments which approximate the conditions of actual service. They are placed on special machines and under heavy loads are run at different speeds in order to make certain that former precautions have really assured their reliability.

The experimental department, in which this work is done, is filled with many machines, in which other trials of the finished bearings are conducted. New steels are developed and tested on the interesting apparatus of this department to ascertain if an improvement is possible. The engineers in charge are continually devising new tests and searching for improvements.

Adapted for Heavy Hauling.

There are a great many sizes of Hy-



Hyatt Roller Bearing: At Left, the Complete Unit; at Right, Inner Race and Rolls Partly Withdrawn from Sleeve.

ted directly over the axle, around which the wheel revolved. The wagon was of the heavy, slow moving type. It carried large loads, but traveled at a snail's pace. Not enough friction was produced when the wheel was in motion to warrant the use of bearings. The simple use of lubricant was sufficient to insure smooth running.

But with the advent of the motor truck, when load and speed were combined, some means of combating the friction element which resulted were necessary, and the anti-friction bearing came into use. There are, however, 12 different types of bearings for various uses. Some of them are particularly adapted for certain work, a fact so generally recognized, that from one to 12 Hyatt bearings are used in 98 different models of motor trucks.

Construction of Hyatt Bearings.

The Hyatt roller bearing is the only bearing of its kind made, and the characteristics which distinguish it from other bearings are the exclusive features of this one bearing—the Hyatt. The Hyatt roller bearing is a development—the culmination of a long period of study, experiment and experience.

Good material is the first necessity. Special steels of different analyses were selected. Each were subjected to various heat treatments. The product of each process was carefully examined and tested until finally a hard, wear-resisting material was evolved, which was highly elastic, and one in which crystallization and the possibility of breakage was practically eliminated.

The Maintenance of Quality.

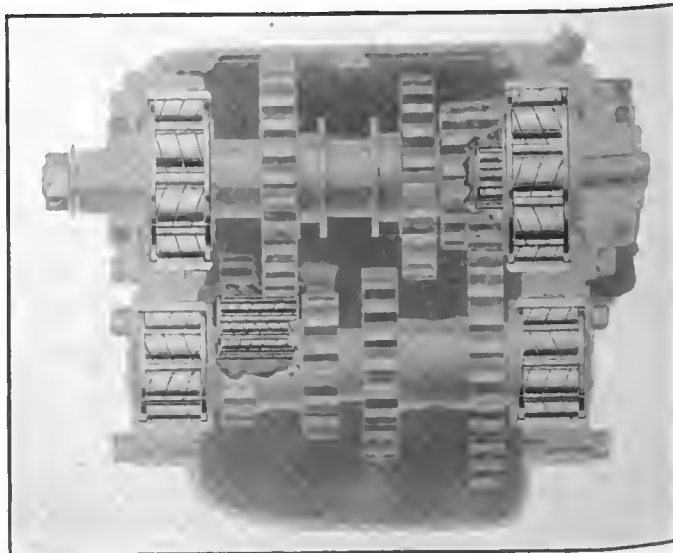
To insure the maintenance of this high quality a selection is made from each bundle of raw steel received. Not only must these samples meet the tests con-

ducted may be interesting to know how this is possible.

An electrically controlled instrument called a pyrometer, is installed in each of the furnaces. From each of these instruments a pair of cables leads to an observation room, where the temperature recorded by the pyrometer may be observed and the operator told the exact degree of heat being maintained in that particular furnace.

The interior of the observation room reminds one of a telephone exchange. Before a marble switchboard, operators are continually checking the temperature of furnaces throughout the building. If the temperature of a certain furnace is correct the operator presses a button and a white light appears both on the switchboard and just above the furnace. Variations are indicated by red and green lights and any deviation is corrected instantly.

The heat treatment so hardens the parts of steel that their size can only be made accurate by grinding. Ordinary machining is inadequate. Special machines are required for this work and hundreds of them are in operation. Another entire factory building is required for this one department. Every load carrying part of the bearing must be ground



Truck Transmission Gearset Bearing in Phantom to Show the Manner of Installing Six Hyatt Bearings.

att roller bearings. Each size is built to perform a certain duty. One of the smaller size bearings is not expected to carry the load for which a larger bearing is intended, because overloading could not be expected to result in satisfactory service. And since satisfactory service to the user is the first consideration with the Hyatt company, no bearings whatever are sold without a careful engineering analysis first being made of all the conditions which might affect the performance of the bearing.

Right conditions are essential to good work and right conditions are assured by this analysis. The motor truck owner may feel confident that the Hyatt bearings in his truck are not smaller than they should be to support the load they must bear, and are not suffering from undue strains, which good engineering would condemn.

And there are other reasons why the Hyatt roller bearing is especially adapted for heavy hauling. In the winding process employed in the construction of the Hyatt hollow roller, the steel fibers form an arch, greatly intensifying the strength of the roller. The fine quality of the steel guarantees a resistance to loads and shocks much greater than it will ever be called upon to stand.

The hollow, spirally wound roller possesses a wonderful advantage over the ordinary solid roller type. It loses none of its strength and gains flexibility. Its construction allows it to deflect slightly through its entire circumference and length, distributing the strain over a much larger area and practically eliminating all local indentation, as is the case with solid rollers or balls. Briefly, the deflection is distributed instead of being localized.

In other words, the flexible rollers adjust themselves to irregularities; they absorb vibration and prevent bumps and shocks from being directly transmitted to the surrounding parts.

Hyatt Bearings Need No Watching.

When the rollers are made some of them are wound to the right, others to the left. When assembled in the cage the right and left spiral rollers are alternated. The hollow centre of each roller serves as a reservoir for lubricant, and when in motion the lubricant passes through the alternately wound spiral slots, and is constantly and evenly distributed over the surfaces of the rollers and races.

Hyatt roller bearings are practically "dirt proof." The rollers are seldom, if ever, worn away by particles of dirt and grit, because they cannot accumulate on the surfaces of the rollers or races, but are quickly forced through the spiral slots into the hollow centre of the roller. "Grit-grind"—the greatest cause of all wear in bearings—is, therefore, a minimum in a Hyatt bearing.

Some bearings are made adjustable, to take up unusual wear. Naturally, it is assumed that they will need adjusting. Such bearings are at the mercy of every inquisitive mechanic who finds the opportunity to tinker with them. Even those who are most competent some-

times err in making the delicate adjustment, and ultimately new bearings and perhaps new gears and other parts are required, involving considerable unnecessary expense for the truck owner.

It was this fact which led the Hyatt Roller Bearing Co. to develop a type of bearing the natural wear of which could be reduced to such a minimum that no adjustment was necessary, even after great distances had been covered by the vehicle of which they were a part.

And many Hyatt bearings have been found which exhibited no perceptible signs of wear even after having performed well during 150,000 miles and more of service. These were not exceptions by any means. In fact, in innumerable instances they have actually lasted as long as the truck itself when given only ordinary attention.

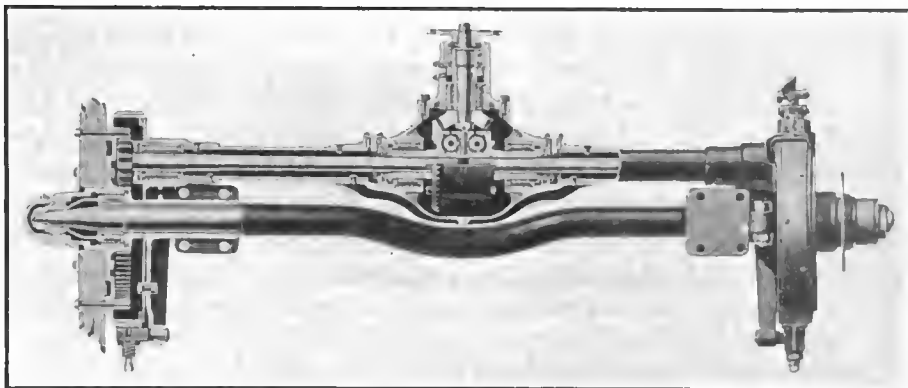
One thing to be born in mind, however, is that the bearing must be correctly installed in the location for which it is designed. So much importance is attached to this fact that while it is not of immediate concern to the company, a still further interest in the user is shown by employing men to visit the automobile car and truck manufacturers and do

Co., with branches in all parts of the country, by means of which bearings can be promptly supplied for replacement or repair purposes with the least possible loss of time to the owner.

SIGNAL TRUCK CO. WILL CONTINUE INDEPENDENT.

The Signal Motor Truck Co., Detroit, builder of Signal trucks, will continue to operate independently, an offer to purchase control of the company having been refused by the stockholders, and plans have been determined by which the concern will have ample resources and will increase its production materially. The company's financial condition, which was never critical, there merely being need of capital to meet the requirements of business expansion, has been improved to a degree that will justify much larger operations.

The activities of the company are directed by John Squires, general manager, and the sales by Sales Manager A. D. Kelley. In a statement concerning the company Mr. Squires is quoted as saying: "There have been a number of



Two-Ton Clark-Celfor Rear Truck Axle, Internal Gear Driven, in Which Seven Large Hyatt Roller Bearings Are Incorporated.

everything possible to insure the proper mounting of Hyatt bearings.

Still other inspectors, trained mechanical men, visit the dealers and distributors for the purpose of finding and remedying any trouble that might have been discovered affecting the performance of Hyatt bearings.

But let us refer again for a minute to the manufacturing and distributing facilities. There is no plant better fitted to assure exactness in the necessary operations than that of the Hyatt Roller Bearing Co. at Newark, N. J. Six thousand expert workmen there occupy a group of 22 modern factory buildings—the world's largest roller bearing plant. The production totals more than three-fifths of all roller bearings made.

In addition, the Motor Bearings Division, located at Detroit, provide the services of a staff of skilled engineers and an experimental department and laboratory right in the centre of the motor industry, while the facilities of the Detroit warehouse assure prompt deliveries at all times.

A complete service system is also maintained through the Bearings Service

statements concerning the affairs of the Signal Motor Truck Co., but we have been too busy arranging for increased production to pay attention to reports of the purchase of the company. We, however, fully realize the merits of Signal trucks and our obligations to our distributors and customers. We have accordingly arranged our plans to make our future and that of our distributors one to be proud of. The Signal Motor Truck Co. will continue to manufacture the various sizes of Signal motor trucks on an increased production basis right here in our present Detroit plant. I cannot discuss our plans for government business."

Because of the shortage of gasoline fuel for internal combustion engines, none being obtainable for many months, experiments are being made in Norway to use acetylene gas as a substitute. Calcium carbide can be produced in large quantities by electricity generated with water power, and from this the gas can be produced. One of the difficulties is storing it in sufficient volume to use it practically.

TRUCK INDUSTRY MUST MAINTAIN MAXIMUM PRODUCTION

Only Relief from Railroad Congestion, Industrial and Commercial Stagnation and Extortionate Charges Is Highway Haulage, Operated to Locality Requirements, and Affording the Certain Service the Business Men Can Rely On.

A MENDMENT of the priorities list by the War Industries Board, which will govern the United States Fuel Administration in the distribution of coal and coke, and which has been issued as of April 15, excludes automobile plants.

There is no qualification whatever. There is no other interpretation than that manufacturers of passenger cars will not be able to obtain fuel until all industries specified in the priorities list have been supplied, and not even then unless there shall be a surplus to distribute.

Neither is there provision that motor truck manufacturers shall receive fuel, although a very large number of concerns are now engaged in filling government contracts, and these will undoubtedly be supplied so long as these contracts exist.

Many of the leading automobile manufacturers (passenger cars only) have been called to Washington to confer with the National Fuel Administrator on the proposal that the production of passenger cars, already voluntarily curtailed 30 per cent., shall be further curtailed to 75 per cent., to take effect on July 1.

This does not mean that the plants shall be closed—they will probably be converted to production essential to the prosecution of the war. If not this, the labor will be diverted to other pressing needs. In any event the output of passenger cars after July 1, unless there shall be radical change of purpose, will be but 25 per cent. of the normal competitive production.

No one questions the wisdom of the decision. There can be no criticism.

The production of power trucks, however, should not be reduced. In fact, every endeavor should be made to stimulate it. The need for trucks was never so urgent. The industry, without considering the demands of the government, cannot build more than a small part of the number necessary to compensate for the shortage of animals and labor.

There is a great economy of labor with every truck used—from two to five drivers and often as many helpers, to say nothing of stable help—and where man power is extremely valuable its conservation is imperative.

Just as men, more men and then more men, and ships, more ships and then more ships, are needed by the government, trucks, more trucks and then more trucks are needed that business shall continue.

And like ships, trucks must be built.

We have the highways. These can be kept in condition to utilize them economically, but without trucks they are absolutely valueless.

Railroads cannot be developed. We shall be extremely fortunate if these can be maintained in the condition they now are, with reference to trackage and rolling stock. There is some probability of water lines—canals—being used for carrying heavy and bulky freights. But with the freight offered very largely exceeding any tonnage ever handled, and with time a factor of first importance, the only hope of the nation industrially and commercially for relief is by the use of trucks.

There is undeniably a dearth of trucks. Every manufacturer can sell a far larger number than can be produced. Practically all trucks are driven over the highways for delivery within 1000 to 1500 miles of the factory. Beyond such radii deliveries may be possible, but the cost is very large, and as railroad shipments are well nigh impossible to obtain, remote sections cannot be supplied.

But where the railroads are most congested, where the highways are best developed, where the demand for transportation is greatest, trucks can be delivered. Trucks are not a non-essential. They are a vital necessity to the business life of the nation. They must be built, and built as ships are building, with greatest speed.

Yet, no matter how many trucks shall be available, they will afford no relief unless used to the greatest degree of haulage utility. They must be used as the government is now using its ships and railroads—to a great comprehensive plan, that shall be based on all conditions and all needs. Independent operation is childish and futile.

The return load proposition is not to be condemned, for it has merit so far as individual owners are concerned, but it does not afford that constant and dependable service that must exist to insure more than casual diversion of small volumes of freight from the railroads. True, operating companies have been organized in many parts of the country, that are operating to scheduled service, but these are but a drop in an ocean as compared with the actual needs. The tonnage carried by them is not sufficient to appreciably relieve the railroads, and the operations are not with reference to obtaining any material or constant relief.

There is no reason to maintain that adequate plan for a nation-wide service has not been proposed. A plan that will meet every condition and every requirement was developed and published in the December, 1917, **MOTOR TRUCK** and subsequent issues.

Business men must remedy the situation and do so as quickly as they can. The demands upon the railroads and other means for transportation will be greatly increased from now on. Systematic highway haulage can give relief, and in proportion to the needs. Prices paid for quick transportation are practically whatever may be demanded. Now \$3 a hundred pounds is paid for freighting 175 miles and \$6 a hundred pounds for freighting 250 miles. Business men do not pay such charges unless there is no other means of transportation. If conditions become worse there is every reason to believe that "jobbing haulage" charges will largely increase. From one point of view this is nothing less than transportation profiteering.

Railroads cannot be operated constantly at a loss. Railroad employees are shortly to be granted an increase of wages, a guess being approximately 20 per cent. This does not mean better service, but still higher rates.

There need be no reason for apprehension that highway transportation shall ever be a competitor with railroads for haulage save for very short distances, if actual expense of freightage is the basis for determination.

With organization of highway transportation companies, with the means of regulation within the control of the business men, with service to meet any demand, and with governmental or other supervision that can be afforded as needed, practical and sufficient relief can be obtained.

The government can sanction the production of trucks. It can direct the distribution of these where they will afford the greatest degree of service.

But the business men must stimulate the establishment of regular haulage service over all main highways, to schedule, and sufficient to transport whatever tonnage of freight is in excess of railroad facilities to handle.

If the condition is met by the business men unitedly and with a definite plan, the results will be wonderfully economical.

If each business man operates independently—one might as well endeavor to bail an ocean with a teaspoon.

FARM TRACTOR INDUSTRY

TRACTORS FIRST—THEN DESIGN

Food Crop Production Depends Upon Getting Machinery of Practical Types—Standardization Incidental to Nation's Needs.



John Deere Tractor Working in Prairie Land Hauling a Gang of Three 14-Inch Bottom Plows.

STANDARDIZATION of farm tractor design has been proposed and has been given much attention by members of the Society of Automotive Engineers. While not specifically stated the principal reason for the proposition is to extend the activities of the S. A. E. to tractor manufacture.

Without criticism of the proposal from the viewpoint of engineering progress, nor taking issue with those advancing it, one cannot overlook the fact that the production of tractors of any type that will serve in agricultural operations during the present need of the United States

ought to be encouraged.

The time is not opportune for retarding production of any power machine that can be practically operated. Normally the productiveness of land or the character of food crops produced would be given no attention. With the extraordinary drain upon the man power of the nation, and this will greatly exceed estimates previously made, farm labor will shrink considerably.

The entire civilized world is dependent upon the food crops grown in the United States and Canada. But these crops must be planted and grown with

labor shortage increasing. The only manner in which this can be compensated is by the use of machinery in every practical way, faster work and longer hours for labor. This prospect is not enchanting, to be sure, but it is the only way of meeting the condition, for if there is failure of the crops great hardship must result.

Practically every tractor manufacturer has determined designs that have been tested for practicality. Most of them have equipment for production—machine tools, machine fixtures, patterns, parts and construction units and other materials. They are prepared to build tractors to these designs. The workmen have had experience in building these types.

Were changes made, even assuming that these had been satisfactorily established as sound engineering and justified by experience, patterns, machine fixtures and other facilities now in use would be discarded and replaced by new. Time would be required for such change. All construction units and parts now available would have to be regarded as spare stock and new materials obtained.

The material manufacturers are working to capacity with numerous orders unfilled, and at best could not immediately produce in any considerable volume. New machines and fixtures could not be replaced without delay. The workers would need be trained. Additional capital would be required and a considerable amount would be represented by spare



Breaking Mesquite Land on the Taft Ranch in Southeastern Texas with a Team of Four John Deere 40 Horsepower Tractors and Gang Plows—A Large Work with Any Machinery.

stock that might not be converted into money in a long time.

Changes of design and production are extremely costly, and certain it is that no manufacturer would sanction large expense without being satisfied that the designs approved would be final. Were there uncertainty this would be determined with experimental machines.

The conversion of a factory of considerable size to produce new types is an undertaking that must be justified both from an engineering and investment point of view, for no manufacturer has capital to waste.

But assuming that change might be practically made, the loss of production

the notes shall mature in six months and the tractors are used for agricultural purposes. In other words, notes given for tractors purchased will be treated as other agricultural paper, so that farmers needing power machinery can buy it when most needed.

STATE SELLS FARM TRACTORS.

With an appropriation of \$100,000 available the Massachusetts state board of agriculture has an option on 1000 Fordson tractors, 25 of which will be retained by the state and used for plowing farms at a stipulated price an acre, and the other 975 will be sold to farmers throughout the state at cost price, so that the buyers will gain the profit that

stimulate the use of power farming machinery.

PROMOTING CITY FARMING.

The Boston city council has appropriated \$22,000 to be expended for the cultivation of war gardens within the city, and a tractor has been purchased with which the plowing will be done systematically. The expectation is that the work will be organized and the amateur farmers will repay the expenditure by the city.

COOPERATIVE TRACTOR WORK.

The Massachusetts state board of agriculture and the farm bureaus of the different counties are systematically organizing the work that will be done by tractors owned by the state, a number of machines being assigned to each county and the plowing and other cultivation being done to the best advantage. The state, however, in return for the assistance, insists that the farmers cultivate all the land possible and raise the largest crops that can be practically handled. A price of \$5 an acre for plowing has been fixed.

STATE AID IN RHODE ISLAND.

The Rhode Island commission of agriculture has bought six tractors and these are now being used in different parts of the state. The commission has received applications for plowing and other cultivation and the tractors are assigned so that there will be comparatively no lost time. The price set for the service is usually \$5 an acre and a



Harrowing and Discing a Stubble Field with a Parrett Tractor, the Big Gang Machines Being Easily Handled.

when the need is so great is a matter of immense importance. The time when crops must be raised is at hand. No matter how many tractors are built the demand will not be met. Until the crops shall be harvested no time should be wasted. Every hour of the day when work can be done should be productive.

After the harvests preparations must be made for even greater crops in the year to come, and this means intensive use of tractors and machinery. Agricultural works should be continued until the ground freezes in the North, or the winter rains in the South cause conditions in which work cannot be practically done.

Standardization may be a splendid proposition, theoretically and practically, but when all the tractors and power tools that can be produced are needed—and there is no need to under-rate the exigency—for the production of crops that will insure the civilized nations against famine, tractors that are operative, that can be produced in largest numbers, are wanted.

HELP FARMERS BUY TRACTORS.

The United States Department of Agriculture has undertaken to aid farmers who have not ready funds to buy tractors. It has made known to all operating farms that the Federal Reserve banks will rediscount notes secured by tractors, and the Federal Reserve Board has authorized member banks to rediscount rates secured by tractors, provided that



Turning Over Heavy Land, a Work Done for Three Years by Joseph Urness, Mahanomen, Minn., with a C. O. D. Tractor.

would ordinarily be made by dealers. The tractors can only be obtained through the board, for the manufacturer will not sell them to dealers or individuals. The distribution is in charge of Leslie R. Smith, superintendent of farm machinery for the board, and the price has been placed at \$765 for a machine, with \$143 additional for a two-gang plow.

GARDEN TRACTOR TRIALS.

At the Essex County Agricultural School in Danvers, Mass., a demonstration was made April 19 of the uses of Beeman garden tractors, for the purpose of showing the practicality of these machines in differing agricultural work. This was part of the state campaign to

tractor is expected to plow five acres a day.

CONTRACT TRACTOR WORK.

In New York state the state food commission owns 60 tractors that are rented to farmers under contract that they shall do as much work as possible for the owners of other farms. In the state are 3000 privately owned tractors, and the food commission through its production bureau is arranging with the owners of these machines to do as much work as is possible on the community plan charging a stated price and affording systematic work as it is required. Statement is made by farmers that the number of machines, no matter how carefully and



Plowing 10 and 12 inches Deep with a Tom Thumb Tractor, That Is Being Operated with a Recording Dynamometer.

systematically they are worked, will meet the demand, and that close to 10,000 tractors would be required to compensate for the shortage of labor. Throughout the state the owners of large farms want tractors so badly that some question the wisdom of using them on small farms, this being based on the belief that there would be a greater productivity if the big farms are intensely cultivated.

PENNSYLVANIA TRACTOR WORK.

The Pennsylvania committee of public safety and defense has doubled the original appropriation of \$50,000 for the purchase of 40 tractors for use throughout the state, and the state department of agriculture will have 80 or more machines available. These are distributed through the different counties where the need for work is greatest and the plan is to work the tractors with two drivers, or 18 hours a day, but this may be increased to continuous operation if necessary.

The charge is \$3 an acre for plowing, \$1.50 an acre for harrowing and 60 cents an acre for discing, in addition to which the farmers must board and lodge the operators while they are on the farms. Tractors will not be sent to any locality unless there is at least 120 acres of work to be done. The expectation is that working 18 hours a tractor can plow 12 acres, or 16 acres in 24 hours. Estimate is made that to do the same work as the 80 tractors with 160 men would require 640 men with approximately 2000 horses. The purpose is to keep the tractors at work until October, under direct state supervision.

TRACTOR SHIPMENT DELAYS.

Only by buying two additional tractors, to make a full car load, funds for which were furnished by patriotic citizens, could the Lackawanna county, Penn., food commission have four tractors shipped to it from Chicago, although there was extreme need of the machines. This was an instance of railroad rules, seemingly well founded, retarding planting and cultivation. As the United States operates the railroads and the government directs the operation of food

distribution, there is apparently no co-operation when a technicality arises. Railroad congestion was also responsible for great delay in transporting a number of tractors bought by Pennsylvania, when there was extreme need for delivery.

COLUMBUS TRACTOR CO. FORMED.

The Columbus Tractor Co. has been incorporated at Columbus, O., by F. A. Miller, Walter A. Jones, Foster Copeland, John W. Kaufmann, William A. Miller, George H. Barker, F. W. Crawford, D. W. Singleton and E. R. Sharp, with capital of \$1,000,000, that has absorbed the McIntyre Manufacturing Co., builder of Farmer Boy tractors, and the plant of the McIntyre company in West Goodale has been taken over and will be operated under the direction of Gebhard Jaeger, general manager. The officers are: Foster Copeland, president; Fred A. Miller, vice president; George H. Barker, secretary; E. R. Sharp, treasurer; Walter A. Jones, chairman of the board of directors. The company builds a three-wheel type tractor that has been largely exported. It has orders that will keep 100 or more men busy for several months. The company owns a 10-acre tract of land and on this expects to erect

more buildings and will considerably expand its plant.

PRICES FOR TRACTOR WORK.

The war board of Cuyahoga county, Ohio, has established prices for work for the machines at \$2 an acre, plus the cost of fuel and lubricant and board for the tractor operator, the total being estimated at \$2.60 an acre, and a minimum rental price of \$20 a field.

GRAHAM TRACTOR TESTED.

A tractor developed by Raymond A. Graham of Graham Brothers, truck builders, of Evansville, Ind., was tested recently at Washington, Ind., and statement is made that it was proven in every way practical. The machine is rated at 30 horsepower and all working parts are enclosed.

TRACTORS SENT TO CANADA.

With the completion of Fordson tractors ordered by the English government, a contract for about 7000 machines, a considerable number were sent to Canada, where they are being distributed through the several provinces, the farmers buying direct from the Canadian government and not through dealers or agents.

STATE TRACTOR TESTS.

At Albany, Ga., May 7 and 8, will take place the first of a series of tractor trials which will be continued through the state in points central to the various congressional districts. Endeavor is to be made to have each farm family in the district represented at the trials. State state agricultural and war organization officials will be present at the trials and the purpose will be to stimulate agricultural production. One of the features of the trials will be plowing and cultivation by searchlight. This is probably as well organized an endeavor to obtain increased agricultural production as has been inaugurated in any state.

TRACTORS FOR FRENCH FARMS.

Henry B. Morgenthau, Jr., is now in France representing the United States government in the distribution of farm tractors to French farmers, the object being to increase food crop production to reduce so far as possible the demand for tonnage to transport food from this country.



Working with a Leader Tractor and a Three-Bottom Gang Plow on Rolling Land with Numerous Deep Gullies and "Draws."

Haul Derrick With Brockway Truck



Two-Ton Brockway Loaded with an 85-Foot Derrick Mast and Boom, Carried from Boston to Providence.

A work that was decidedly unusual was carried out by Daniel Marr & Sons, general contractors, which has a yard at South Boston, Mass., this being the haulage of a derrick having a mast 85 feet long and a boom 76 feet long from the plant to a large factory being constructed for the General Electric Co. at Providence, R. I. The weight of the derrick was approximately three tons, and it was moved a distance of nearly 50 miles on a two-ton Brockway truck, which is one of a fleet of five machines operated by the company.

While the derrick was in itself practically a 50 per cent. overload, the greatest difficulty was in placing it on the truck so that it would "ride" without danger to the vehicle and it could be carried through the streets and roads, because 14 feet is about the average clearance of overhead construction, such as viaducts, bridges, elevated railroad and telephone, telegraph and trolley wires. The only way it could be loaded was to so centre it on the truck that it was balanced with reference to overhang, that hills could be ascended and descended without the centre of gravity being overcome, there being about 35 feet of the mast extending ahead and back of the truck. It could only be carried by mounting the forward end above the driver's seat, and this extreme height of the centre of gravity necessitated unusual care in driving.

What were practically wooden cradles were placed at the front and rear of the truck platform and the mast and boom were placed on these and securely lashed, and when freighted the machine was driven to Providence without incident. When the work was completed the truck was sent to Providence and brought the derrick back to Boston. Marr & Sons until that time had hauled all its special equipment with horse teams or shipped by railroad and obviously a very large saving of time and money resulted. Now all such work is done with trucks.

Walsh Bros., Sioux City, Ia., has been appointed distributor of Filton trucks for Iowa, Nebraska and South Dakota.

JUDICIAL TRUCK BUYING.

In Missouri the judges of the county courts are charged with the direction of the county municipal organizations and

have jurisdiction over the various departments, such as the courts, highways, bridges, correctional institutions, etc. In Greene county the judges, after deliberating upon the shortage of help, the condition of the highways and the number of prisoners in custody, authorized the purchase of a Republic truck and trailer to be used for highway and construction work and ordered the county sheriff to submit a report of the able bodied inmates of the jail, who will be given consistent and regular exercise building and repaving roads.

ATLANTIC CITY SHOW.

At an exhibition of power vehicles held at the Garden Pier at Atlantic City, N. J., 23 different makes of trucks were displayed, several of which were special built machines that will be used for passenger service by hotels of that city. Among those shown were three Fultons.

The L. J. Robinson Co., Detroit, Michigan agent for Maxwell trucks, has appointed Wayne Murray general manager. He has been connected with several car, truck and tire companies and is widely known in the industry and trade.

Motor Driven Unit Funeral Car

A unit funeral car, that is, a single vehicle that is intended to transport an entire mortuary company from a church or residence to a cemetery, and which is expected to serve more acceptably than smaller animal or power units now used, has been designed and several are now in service as undertakers' equipment. From the viewpoint of carrying a number of people comfortably and conveniently, obviating waits and delays incident to the arrangement of funeral trains as is now customary, and insuring protection to those who accompany the dead to the last resting place, there is much to commend this type of vehicle. But there are limitations so far as numbers are concerned. There is another consideration as well, and that is that when such equipment are owned by undertakers they can positively control them and be certain of any service that might be required. The utility of the car where a considerable distance must be traversed is obvious.

The type of car illustrated consists of a three-ton truck chassis on which is mounted a body 22 feet 10 inches overall, with outside width of 99½ inches and inside width of 74 inches. At either side are six windows and a door for the driver's compartment, all of which have drop windows. The two doors of the casket compartment have stationary glass panels. The rear windows are also fixed. All windows are draped with silk curtains. Above the doors are transoms of Florentine windows, each alternate window on hinges. The body is lighted with three dome lamps and two telephones connect the passenger and the driver's compartments. The car will carry 38 persons comfortably. The casket compartment has a shelf 22½ inches from the floor fitted with rollers and stop pins. The upholstery is Fabrikoid. At either side of the car is a folding step which is shown lifted. The cars are finished in black or gray.



Unit Funeral Car Having Three Compartments, That Will Carry a Casket and a Company of 38 Persons Comfortably Seated.

Truck Insurance Rates Raised

Notice has been sent out by the Eastern and New England Automobile Underwriters' Conferences of increases in limits of insurance as follows:

By resolution of the Executive Committee of the National Conference, the percentage limits of insurance allowable upon last year's cars (that is cars bought new more than six, but not more than 18 months prior to insurance) columns C, D and E; and year before last cars (that is cars bought new more than 18, but not more than 30 months prior to insurance) columns B, C, D and E, are increased by adding 10 per cent. to the percentage limits of insurance shown on the present rate sheet.

This makes the percentage limits of insurance read as follows:

Last year's cars (that is cars bought new more than six, but not more than 18 months prior to insurance):

Column A.....No limit
Column B.....80 per cent.
Column C.....80 per cent.
Column D.....70 per cent.
Column E.....70 per cent.

Year before last cars (that is cars bought new more than 18, but not more than 30 months prior to insurance):

Column A.....No limit
Column B.....60 per cent.
Column C.....60 per cent.
Column D.....50 per cent.
Column E.....50 per cent.

These changes apply to both passenger and commercial type cars and are effective immediately.

UNCLE SAM CLAIMS FRAUD.

A Federal grand jury sitting in New York City has indicted Harold Avery and Clarence E. Walker, truck service contractors, for alleged presentation of false claims with intent to defraud the government. The facts stated for the grand jury to consider was that the accused furnished trucks for use in connection with structural improvements at Governor's Island in January, February and March, the rate being \$2.50 an hour; that bills for \$1355 were presented to Capt. David E. Bergen of the Quartermaster's Reserve Corps for the use of trucks for from 80 to 90 hours, and that the trucks were used but 18 hours.

KELLY-SPRINGFIELD PLANT.

The new factory building of the Kelly-Springfield Motor Truck Co., Springfield, O., will be completed before the end of the present month. The structure is being erected by the company, no contract being made, and it is concrete, steel and brick, two stories, 170 by 70 feet.

C. H. Larson has been made New York City distributor of Master trucks. He has for years been engaged in the sale of passenger cars.

COL. GEORGE POPE DEAD.

Col. George Pope, for years one of the most prominent men in the automobile industry, died April 19 at his home at Hartford, Conn., aged 74 years. He became associated with his brother, Albert L. Pope, first in the sale of imported bicycles in Boston and later with him was interested in the Pope Manufacturing Co., which was organized to manufacture bicycles. He was treasurer and a very active member of the Pope Manufacturing Co., which was removed from Boston to Hartford, in the development of and the manufacture of automobiles, and he was also treasurer of the Pope Motor Car Co., Indianapolis, Ind., which built electric vehicles.

The Pope Manufacturing Co. built bicycles and motorcycles at Westfield, Mass., cars and trucks at Hartford, cars at Toledo, O., and electric cars both at Hartford and Indianapolis at different times. The Popes were also interested in the Columbia Manufacturing Co.,



Col. George Pope, Former Treasurer of Pope Manufacturing Co., President of National Association of Manufacturers, and Chairman of A. L. A. M. Show Committee.

which was merged with others and became the Electric Vehicle Co. When the fortunes of the Pope family waned Col. Pope was receiver for the Pope Manufacturing Co., and his last activity in the industry was in that capacity. He was president of the National Association of Manufacturers for five years, and he was chairman of the show committee of the Association of Licensed Automobile Manufacturers, which for years organized the New York automobile shows with the Automobile Club of America. Col. Pope was a veteran of the Civil War, enlisting in the 44th Massachusetts Infantry, being made a captain in the 54th Massachusetts regiment (colored), and was a major at 20 and a lieutenant-colonel at 21.

S. A. House, formerly sales manager of the Auto Wheel Co., Lansing, Mich., has joined the Hayes Wheel Co., Jackson, Mich., in a similar capacity.

DOTTERICH JOINS THE BEARINGS SERVICE CO.

H. J. Dotterich, who was for two years assistant advertising manager of the Paige-Detroit Motor Car Co., Detroit, resigned that position April 15 to associate himself with the Bearings Service Co. as advertising manager. Previously Mr. Dotterich was connected with the advertising department of the Studebaker Corporation. He has had broad experience with the automobile vehicle industry. The business of the Bearings Service Co. has increased very rapidly, it now having 22 branches and more than 500 distributors, so that its advertising department is a very important factor in its operation.

PITTSBURGH TRUCK SHOW.

The motor truck show at the Motor Square Garden, Pittsburgh, Pa., organized by the Automobile Dealers' Association of Pittsburgh, which was from April 6 to 13 inclusive, consisted of the exhibits of 36 makes of trucks by 30 different concerns and individuals. A great deal of interest was manifested by the public, so much that there is reason to believe the truck show will be an annual event. More applications were received for space than could be allowed, and had more floor area been available the show would have been considerably larger.

NEW MOTOR TRUCK PLANT.

Work has been begun at the Davenport Foundry, Stamford, Conn., controlled by A. B. Bensch & Co., erecting a large one-story brick structure that will be generally devoted to the manufacture of power trucks and gasoline engines. New machinery has been ordered and when it is installed a force of about 200 hands will be employed. The details of the truck design have not as yet been made public.

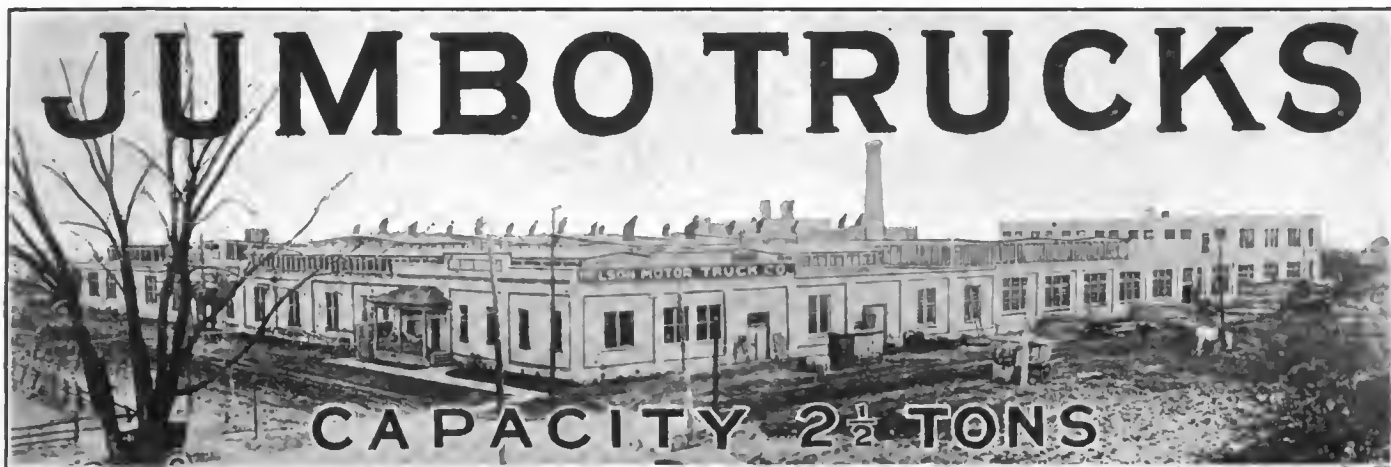
NO SPOT LIGHT WANTED.

Frank M. Letendre, himself an automobile dealer and operator of a truck haulage service at Woonsocket, R. I., has introduced into the Rhode Island Legislature, of which he is a member, a bill prohibiting the use of spot lights on all power vehicles used on the highways of that state.

MILES ASSISTING CHAPIN.

Samuel A. Miles, manager of the New York and Chicago motor vehicle shows for the National Automobile Chamber of Commerce, is now engaged in Washington, assisting Chairman Roy D. Chapin of the Highways Transport Committee of the Council of National Defense.

The Falls Motor Corporation, Sheboygan Falls, Wis., is erecting a one-story addition, 60 by 135 feet, to its plant, which will be followed by other construction.



CONSTRUCTION of a single size machine, in such numbers as will meet any demand that may be realized, is the policy of the Nelson Motor Truck Co., Saginaw, Mich., which on April 1 began the production of trucks of 5000 pounds load capacity, which will be sold under the trade name of Jumbo. Concentration upon one model was determined after careful consideration of the market and the requirements of business men, and the factory facilities have been developed with this main object. The stated purpose is to standardize this machine and to produce it in as large numbers as is possible, this being based upon the belief that such standardization and manufacturing has decided advantages, and will justify what may be regarded as an extremely low price for a truck of the Jumbo capacity.

The Nelson Motor Truck Co. has been organized with capital of \$300,000, all of which has been paid in, and practically all of the stock is held by the several Nelson brothers, who own and operate at Saginaw a large plant devoted exclusively to the manufacture of stationary engines and pump jacks. This industry has been developed from a very small shop, the business engaging in keen competition with others and with extremely limited resources, until it is now one of the largest concerns building engines and pump jacks, and its products are sold in all parts of the world.

Having a broad and practical knowledge of manufacturing and business methods, the Nelson brothers formulated plans for the new company that are fundamentally sound and undoubtedly progressive. First a careful survey was made of the power truck industry and the probable market with a view of determining what type of truck was most demanded. When the 5000-pound size was approved as being the best for the proposed company to produce a design was

considered and decided upon. The belief was that machines constructed from units produced by specialists, which were known and regarded as having mechanical quality, would be accepted because of the knowledge that they had met practically all service requirements as against what might be equally good, but not known.

Chose Standard Construction Units.

The choice of units was made to obtain a vehicle that would have every essential quality, strength with minimum weight, simplicity, accessibility and long service endurance, and which would be economical with reference to operating and maintenance expense. The units were not determined until after careful and exhaustive tests had been made in several experimental machines, which had been assembled with the object of obtaining unusually strong construction. These trucks were driven for months and were constantly observed, the records showing detail of work and conditions of work as well as the results mechanically.

The truck design decided upon included Buda model HU engines, Fuller mul-

form or harmonized chassis.

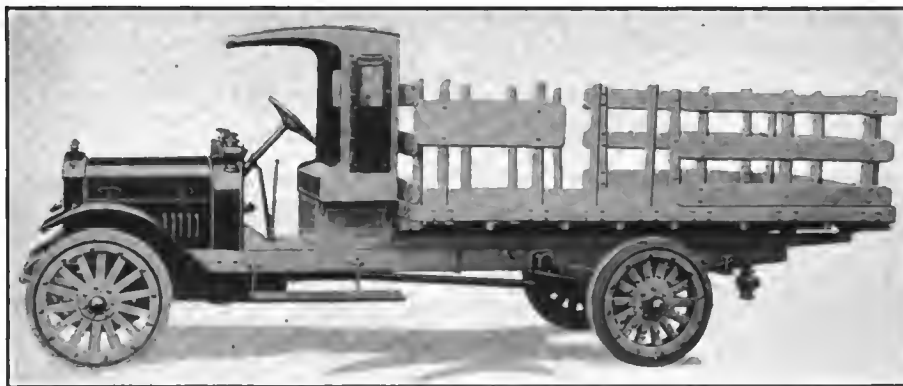
After the details of the truck had been developed the company was organized and the policies arrived at. After the capital had been made available the company acquired the plant that has been used by the Argo Electric Vehicle Co., and this has been altered and adapted for manufacturing and new machinery has been installed and is now being operated. This factory, however, was not considered adequate for the operations of the company as comprehended by its plans and a property of 20 acres was purchased and preparations are making for erecting and equipping a large plant, which will be operated with the present works as soon as it shall be in readiness, which will, in all probability, be during the coming summer.

Meantime a part of the engine building plant of Nelson Brothers has been given over to body production, painting, etc., this being adjacent to the old Argo factory and the recently purchased site. With the use of the Nelson Brothers' plant a maximum production of five trucks a day can be obtained before the new factory is completed, but later on the limitation of the output of the company will be practically the demand.

Prior to beginning manufacture plans were made for a sales organization which has been in part perfected, and distribution will be in part through the very widely developed selling channels of Nelson Brothers. Many of the largest distribu-

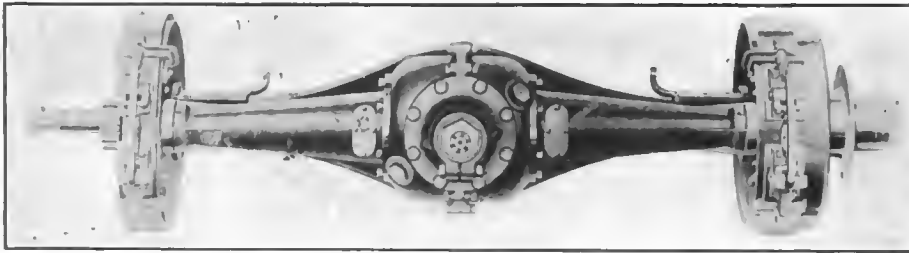
tors of Nelson engines, pump jacks and feed grinders will also sell Jumbo trucks and these have been made a nucleus for marketing the machines. The exportation of Jumbo trucks will be through the John Simmons Co., New York distributor and exporter of Nelson engines.

The officers and executives of the Nelson Motor Truck Co., are as follows: President, H. B. Nelson; vice president, C. A. Nelson; secretary-treasurer, C. J.



The Jumbo 5000-Pound Truck, the One Size Built by the Nelson Motor Truck Co., Saginaw, Mich.

multiple dry disc clutches and selective type transmission gearsets, Arvac universal joints, Celfor internal gear rear axles, Shuler front axles, Detroit springs, Driggs-Seabury (Savage Arms Co.) frames, Jacox steering gears and G & O radiators, with Zenith carburetors, Elsemann magnetos and Duplex governors. All of these were adopted and the details of construction were worked out so as to obtain what may be regarded as a uni-



Front View of the Clark-Celfor Internal Gear Rear Axle Used in Nelson Trucks, Showing the External Contracting Brake Shoes.

Nelson; purchasing agent, C. A. Nelson; chief engineer, J. H. Hunt; factory manager, H. B. Nelson; sales manager, E. B. Sutton; advertising manager, C. J. Nelson.

Standardized One Design.

The policy of the company has been to standardize its design and the one size will be produced unless there should be developments that will cause this to be changed. But in any event there will be no other variation of design than in dimensions of parts, which will be variable with load capacities. Standardization and production in large numbers is expected to justify an extremely low selling price. Jumbo trucks will be listed at \$2250 f. o. b. Saginaw, this including driver's seat, fenders, running boards, oil dash and tail lamps, jack, tool box, tools and the other items of standard equipment.

Statement is made that this price is expected to be maintained, despite the advancing cost of material and that through standardizing and with the operation of the factory cost and efficiency system which has made possible rapid and substantial growth of Nelson Brothers, which will be applied in the truck plant, production cost will be minimized. Incidentally, Jumbo trucks are guaranteed for a year, which is substantial evidence of the confidence of the company in the quality of the construction units and the assembly parts, as well as the methods of assembling.

Buda Model HU Engine.

The model HU Buda engine is the type on which the Buda company is now concentrating its production, which has been adopted by the United States government as meeting its requirements for

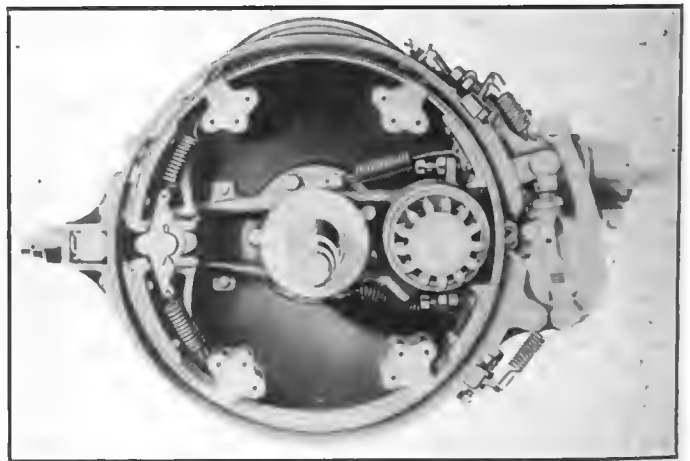
certain service with very slight modifications, and which is now being built by other engine manufacturers under license granted to the government for the duration of the war. The engine is designed for heavy duty truck and tractor service and has extremely efficient lubricating and cooling systems. The engine is a four-cylinder, four-cycle, water cooled, L head type, with the cylinders cast en bloc, with the water jacket integral. The block is cast with the water jacket head open, which insures uniformity of cylinder and jacket walls and the water chambers can be cleared thoroughly, insuring freedom of circulation and high cooling efficiency.

The jacket head is cast with the water outlet manifold integral and this is done to obtain a large volume of water over the cylinder heads. It is retained with a series of studs and cap screws and can be easily removed for cleaning or inspection. The water intake is baffled so that the water enters the jacket directly under the exhaust valves, effectually cooling them. The block and the head are cast of high grade iron and are machined carefully to insure exactness and interchangeability.

The crank case is cast from gray iron

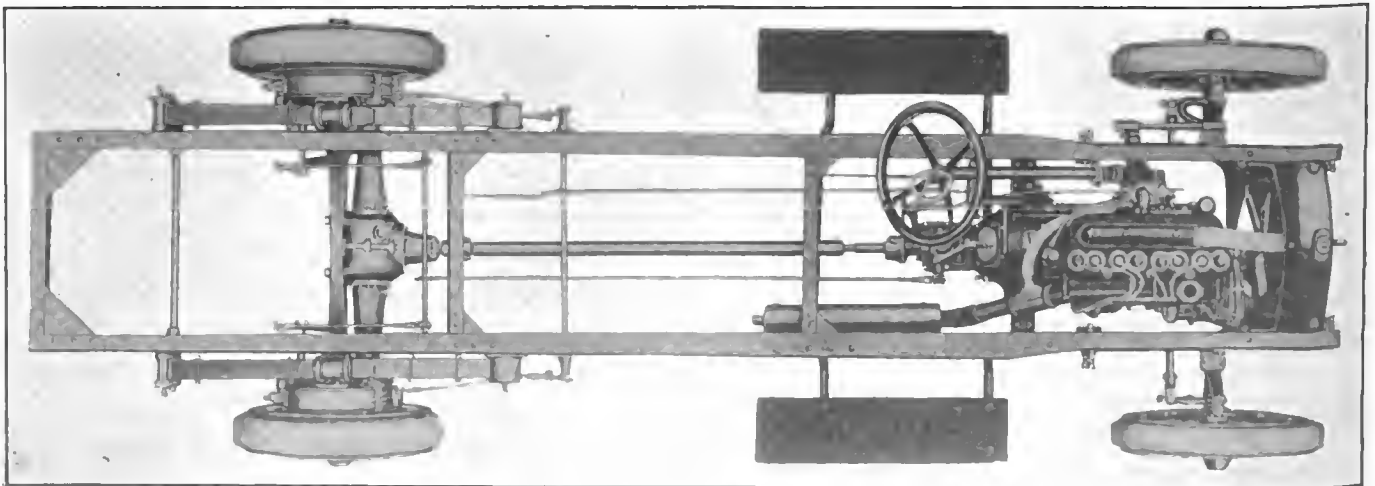
and is in two sections, the upper half being divided with a transverse vertical web that carries the centre main bearing, and the rear support arms are formed integral with it. The lower section is fitted with a removable plate that forms the base of the crank chamber and the top of the oil reservoir. This plate is easily removable for cleaning the oil reservoir. Both sections have forward extensions that house the timing gearset and rear extensions that enclose the flywheel and form the bell housing to which the clutch and transmission gearset housing is bolted. The pistons are gray iron castings that are carefully turned and are fitted with three channels for diagonally split eccentric compression rings, the rings being carefully ground on the edges and circumferences to exact fit.

The crankshaft is drop forged from alloy steel with the flywheel flange in-



End of Clark-Celfor Internal Gear Axle with Wheel Removed, Showing the Spindle, the Driving Pinion and the Brake Mechanism.

tegral and is heat treated and ground with great care. It is a three-bearing type, the journals being $2\frac{1}{8}$, $2\frac{1}{4}$ and $2\frac{1}{2}$ inches diameter respectively from front to rear, and the journal lengths are in the same order $3\frac{1}{2}$, $2\frac{1}{2}$ and four inches, having a total length of $9\frac{1}{8}$ inches. The connecting rod journals are $2\frac{1}{8}$ inches diameter and $2\frac{1}{2}$ inches length. By heat treatment the tensile strength of the



Top View of the Jumbo Chassis, Stripped to Show the Power Plant and Power Transmission System and the Spring Suspension to Obtain Low Centre of Gravity of the Load.

shaft is made 120,000 pounds to the square inch and the elastic limit 85,000 pounds to the square inch.

The Engine Construction Details.

The connecting rods are I section steel drop forgings and are bored and finished with unusual care to obtain alignment and exact weight and balance. All caps are fitted with four nickel steel bolts. The camshaft is a three-journal type of large size, drop forged from special steel, with the cams and the timing gear flange integral. The shaft is ground and case hardened, and is worked on a special machine to obtain extremely accurate balance. The cams are wide and will wear very slowly. The timing gear-set consists of crankshaft, camshaft and water pump shaft gears, which are large size and have wide faces. The gears are helical cut and much care is taken to obtain accuracy of centres. The gears are designed to have long endurance and operate noiselessly.

lock nuts that are fitted in removable guides seated in the base flange of the cylinder block. The entire valve mechanism is enclosed by cover plates that are secured by studs and wing nuts and are quickly removable.

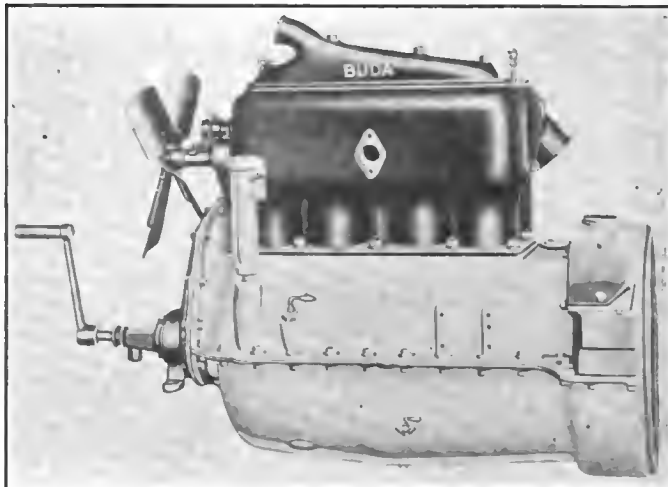
The engine has a cylinder bore of $4\frac{1}{4}$ inches and stroke of $5\frac{1}{2}$ inches, and is rated by the S. A. E. formula at 28.90 horsepower at 1190 revolutions a minute, but it will develop much in excess of this rating, showing 52 horsepower by brake test at 1800 revolutions. This is far more power than will be required in any operating condition, even were the load far more than the rated capacity of the truck.

Cooling and Lubricating Systems.

The engine is cooled by a circulation of water forced by a centrifugal pump with a large bronze impeller, through the cylinder jackets and a radiator with cast top and bottom tanks and a removable core of zig-zag tube, having large capacity. The cooling is promoted by a large fan carried on an adjustable bracket on the forward end of the cylinder block on anti-friction bearings, that is driven by a flat belt from a pulley on the water pump shaft.

The lubrication system is a positive pressure type that is maintained to be especially efficient. The oil is drawn from the reservoir in the base of the engine case through a filter screen by a gear pump and is forced through pipe leading to the main bearings, camshaft bearings and the timing gearset, thence through passages in the crankshaft to the connecting rod bearings and through tube to the wristpins; the cylinder and piston walls are lubricated by the spray thrown off by the centrifugal movement of the crankshaft, as are the cams and valve tappets and valves.

The clutch is a multiple dry disc construction that does not require lubrication save at long intervals, and it is easily reached for adjustment or inspection. The transmission gearset is also a Fuller construction, having three forward speed ratios and reverse. The shafts and gears are large, of $3\frac{1}{2}$ per cent. nickel steel, and the shafts are carried on annular ball bearings. The engine, clutch and gearset

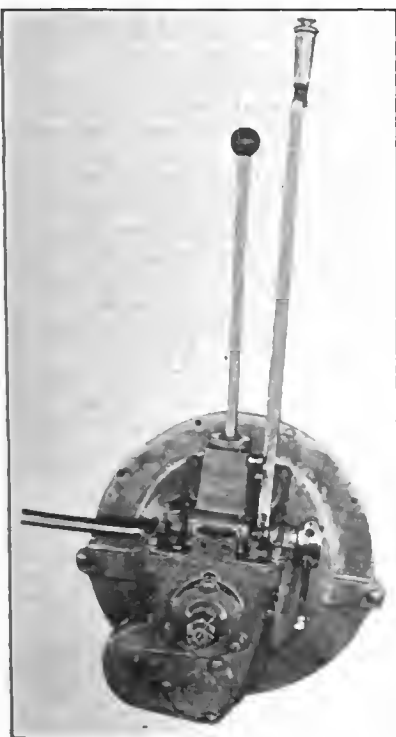


Intake Side of the Buda Model HU Engine, Without Carburetor, Clutch or Transmission Gearset.

are assembled as a unit power plant that is mounted on a trunnion on the forward cross member of the frame and on arms on either frame side member, being protected against chassis distortion. The engine is governed to a speed of 14 miles an hour by a Duplex governor driven from both engine and drive shaft, controlling both engine and vehicle speed. The source of ignition current is an Eisemann magneto with fixed spark, and the fuel is supplied through a Zenith carburetor.

The drive is by a large tubular shaft with an Arvac universal joint at either end to the pinion shaft of the Clark-Celcor internal gear driven axle. This axle has an I section dead axle that carries the load, the jackshaft being constructed with the central section bolted to the dead axle, the jackshaft housing ends being carried by the flanges that carry the brake shoes and which form the inner sides of the housings of the brakes and the internal gears and pinions. The load is carried by the I beam and the jackshaft drives the internal gears, which have a gear reduction of eight to one. The front axle is a Shuler, an I section type of drop forged steel, that is exceptionally heavy.

The frame is a Savage (Driggs-Sea bury) pressed steel channel section, 208

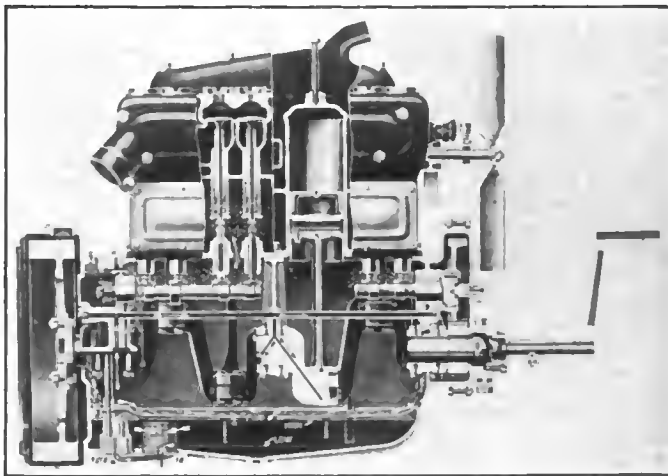


Rear End View of the Fuller Multiple Dry Disc mud Transmission Gearset Unit.

The main and connecting rod bearings are babbitt metal mounted in bronze shells that are fitted with shims by which adjustment can be made. The three camshaft bearings are phosphor bronze and are large dimensions. The small ends of the connecting rods, which oscillate on tubular steel wristpins seated in the piston bosses and secured by set screws, are bushed with phosphor bronze and oscillate on the wristpins. The wristpins are large size and are hardened and ground.

The Valve Mechanism.

The valves are cast iron heads electrically welded to steel stems, and are seated in ports $1\frac{1}{8}$ inches diameter. The valve stems operate in long renewable guides. The valve tappets are a mushroom type with adjusting screws and



Sectional View of a Model HU Buda Engine, Showing the Details of the Full Pressure Oiling System.

inches long, 34 inches width, made from $\frac{1}{4}$ -inch stock, $5\frac{1}{4}$ inches deep, with four sturdy cross members, generously reinforced and strongly gusseted, which is carried on Detroit spring, semi-elliptic, the forward set being 40 inches long and $2\frac{1}{2}$ inches wide, and the rear set 54 inches long and three inches wide. The axles are fitted with Prudden wood wheels, artillery type, each having 14 $2\frac{1}{2}$ by $2\frac{1}{2}$ -inch spokes, that are shod with solid band tires, 35 by four inches forward and 35 by six inches rear. The standard wheelbase is 144 inches and the optional length is 168 inches. The tread is 56 inches forward and 59 inches rear.

The steering gear is a Jacox, a block and worm type, adjustable for wear, that is located at the left side, and the control is by the customary foot clutch and service pedals and an accelerator pedal, with a throttle lever on the steering wheel and centre levers that operate the transmission gearset and the emergency brakes. The service brake is an external contracting type and the emergency brake an internal expanding construction, both operating on the drums on the rear wheels. The fuel is fed by gravity from a $13\frac{1}{2}$ -gallon tank under the driver's seat. The chassis is finished in Nelson gray, ready for painting in colors.

ARNOLD SELLS REPUBLICS.

Harold Arnold, for several years distributor in Southern California and Arizona for Dodge and Hudson cars, has been appointed distributor for Southern California for Republic trucks, and is perfecting a dealer organization, of which Fred Albertson is sales manager. Mr. Arnold succeeds D. J. Poyer, who has been made general manager of the new Republic assembling plant at Los Angeles.

NO CHANGE FOR AUSTIN.

R. W. Austin, vice president and a member of the board of directors of the Gramm-Bernstein Motor Truck Co., Lima, O., has made statement that he does not intend to retire from that concern or the offices he holds, this being prompted by rumors that he was to associate himself with another company.

GRAMM-BERNSTEIN SALES.

John L. Judd, 1106 Commonwealth avenue, Boston, Mass., who is one of the best known men engaged in the power vehicle trade, is systematically developing a sales organization for New England for Gramm-Bernstein trucks, for which he recently became distributor.

The Taft-Pierce Machine Co., Woonsocket, R. I., has engaged William H. Oliver, Jr., formerly chief engineer for the Hyatt Roller Bearing Co., Newark, N. J., and the Russell Motor Axle Co., North Detroit, Mich., in its engineering department.

DISTRICT MANAGER WYMAN.

S. W. Wyman has been appointed district manager of sales for the International Harvester Co., and will supervise the sales organization of the company in the United States west of the Mississippi river. Mr. Wyman knows International trucks as few other men know them. He was engaged by the company 10 years ago as a salesman at Auburn, N. Y., and that season he sold 15 trucks, but the company could only deliver 13 and refunded the payments made on two. Five years later he sold 101 trucks in one year. Each year he has done better and this is the principal reason why the company appointed him to direct its sales in considerably more than half of the nation.

The International Harvester Co. in 1916 increased its sales 100 per cent. In 1917 the company enlarged its factory and increased its sales 100 per cent. On March 16 of this year the sales for 1917



S. W. Wyman, Western District Sales Manager International Harvester Co.

as represented by cash had been exceeded and there is every reason to believe that the percentage of increase for 1918 will be close to if not quite 200 per cent.

HOPFORD CONVERSION UNITS.

Conversion units in two sizes, which can be adapted to convert the chassis of 15 or more makes of passenger cars into freight carrying vehicles having load capacities of 2500 or 4500 pounds, are produced by the Hopper Auto Sales Co., 172 Main street, New Rochelle, N. Y. The units are internal gear driven.

IOWA LICENSE PENALTY.

The new Iowa law regulating the use of power vehicles became effective April 1 and a provision of this is that for failure to register a penalty of 10 per cent. of the licensing fee is exacted, with five per cent. each additional month until paid.

REPUBLIC ASSEMBLING PLANT.

Exceptionally large demand for Republic trucks on the Pacific coast has impelled the Republic Motor Truck Co. to establish a large assembling plant at Los Angeles, Cal., at which operations were begun March 15. The expectation is that the company will soon be able to assemble not less than 250 machines a month.

The works is located on a $12\frac{1}{2}$ -acre tract in the Vernon section, including buildings having working floor space of six acres, in addition to which is a well equipped drying kiln, a paint shop, a large boiler house and an office building. There are two railroad sidings to the property, which afford exceptional shipping facilities.

The plant is managed by D. J. Poyer, who was for a considerable period Republic distributor for Southern California. The operation of the plant was begun during the visit of General Sales Manager M. A. Holmes and Treasurer George Moore of the Republic company to Los Angeles early in March. They were much impressed with the possibilities for Oriental export business, as shipping can enter the new Los Angeles harbor under power, and foreign shipments can be made direct with minimum cost for handling and transportation. The company has sufficient ground to double the capacity of the plant as occasion requires.

COURT FORCED TRUCK ORDER.

An order by Supreme Court Judge Rudd compelling the minority of the Troy, N. Y., city council to sign the estimate of the city's expenses for 1918 was the reason that the board of contract and supply of that city passed a resolution to spend \$10,000 for two trucks for the street cleaning department, these to be equipped as flushers.

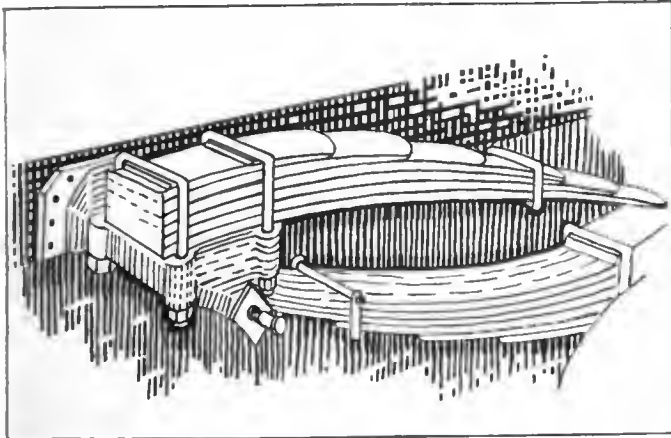
FEDERAL TRUCK PROFITS.

After deducting \$225,000 for excess profit tax the Federal Motor Truck Co., Detroit, shows by its annual report profits of \$546,824 for 1917. The company has capital stock of \$1,000,000. The total sales for the year reached \$6,005,246. The profit and loss account as of Dec. 31, was \$698,993.

Beckwith Have, now serving in the Navy as a lieutenant commander, was formerly a traveling representative for the Denby Motor Truck Co., Detroit, in its export department. His appointment was received after a year's absence in Australia, New Zealand, Dutch East Indies, Japan and the Philippine Islands.

The Ford Motor Co.'s plant at Detroit was closed to visitors April 6, this being a requirement of the government, for the company is largely engaged in government work. For years the Ford works has been one of the principal places of interest for visitors to Detroit.

CHARACTERISTICS OF TRUCK DESIGN



The Cantilever Auxiliary Spring That Affords a Semi-Elliptic Action on International Trucks.

PERFECTION of chassis assembling is the main object of all engineers engaged in truck construction. This may be applied to truck designing by many persons who are not aware of the fact that a comparatively small number of power vehicles are built today by the industry—that to the contrary a very larger part, probably close to 93 per cent. of all wagons and trucks produced by the industry are constructed from units built by specialists.

The first power vehicle that could consistently be classed as a truck was built in America in 1895 and completed in 1896, being exhibited as a vehicular development of exceptional economic value at fairs in New England. This was the first American freight carrying machine driven by an internal combustion engine consuming gasoline. In the 22 years elapsed since the truck was built a great progress has been made. Through experiment and service, and the influence for standardization of the Society of Automotive Engineers and its predecessors, the manufacturers of automobile vehicles have concentrated on certain general principles of design for construction units, so that, instead of each make of machine representing a distinct type, they may be said generally to be very much alike, differing usually with reference to units and to manner of assembling.

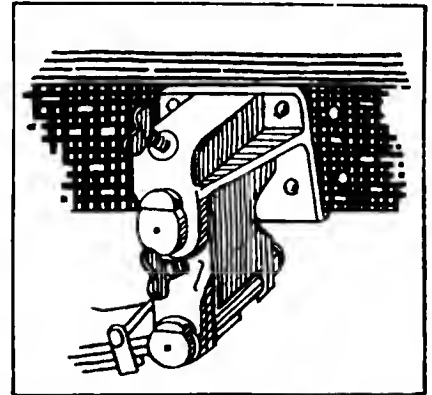
One cannot well maintain that all trucks of similar load capacity rating are alike. While the majority of truck builders rate the machines they build on the basis of maximum freight that can be carried, there is no standard by which the power weight carrying units essential or desirable are de-

termined. For instance, the engines may differ with regard to power production, the clutches and the transmission gear-sets have variable transmitting capacities and in the same sense all of the units throughout the chassis may be of different dimensions.

Danger of Frame Rigidity.

One condition that is fully recognized is the danger of rigidity of frames because of the strains from unequal distribution of loads carried over uneven surfaces at speeds, and the frame members must be sufficiently flexible to yield without becoming permanently distorted and must be so reinforced that they will not break apart nor wear where they are joined, as might be the result from working with overloads. As overloading is one of the probabilities of power vehicle use, and overloads will sometimes be far greater than the maximum rating, the frame must be built so that it will have a very large margin of safety.

Probably the most severe duty of any chassis units is endured by the suspension members, and these are selected with as large a factor of safety as is possible to obtain and yet afford the protection through absorption of the road shocks. Spring manufacturers design their products for specific work and the type and material are carefully determined, but these cannot be made so heavy that they will endure large overloads unless they are so stiff that they will not absorb the vibrations when not fully freighted. Obviously springs made for carrying definite loads should not be overloaded, and overloading is possible because of the centralization of weight on a body when a truck may not be freighted in excess of capacity. The spring maker will produce what is adequate in strength for the work specified, but overloading may be both from excess weight and the strains and stresses from driving at speed on rough surfaces.



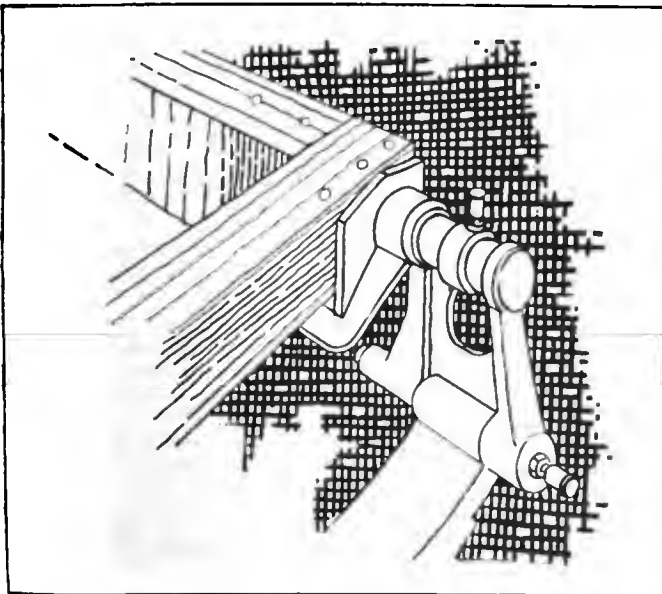
Rear Spring Hanger and Block Shackle Having Cast Oiling Reservoirs on Chevrolet One-Ton Truck Chassis.

Some construction engineers use comparatively light springs to absorb the vibratory stresses when freighted lightly or unfreighted, with auxiliary springs that will become operative in ratio to the load carried and the work. What is a novelty and yet appears to be an exceedingly practical method of rear spring suspension is found on the model G International trucks, built by the International Harvester Co., for this comprehends the use of half springs, operating exactly as do any cantilever installation, that are mounted on the forward hangers or brackets of the rear springs.

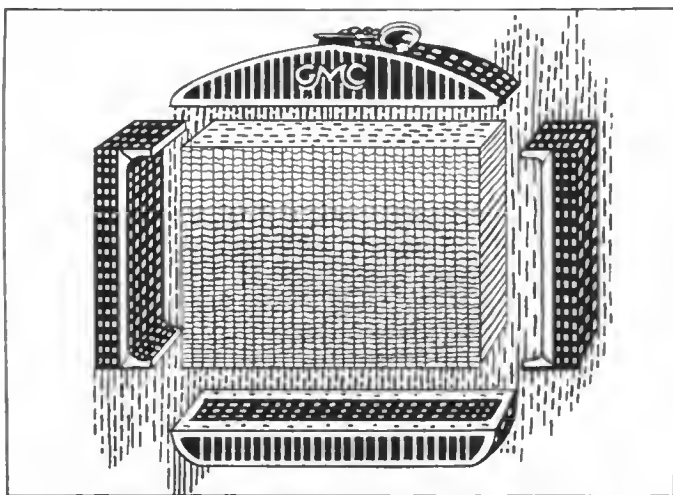
The principle of suspension is the Hotchkiss, no radius rods or torque rods being used, the drive being through the springs, which also take the torque and braking stresses. The brackets are bolted to the side members, having long, flat offsets. The forward spring eye is pivoted on a large bolt under the offset, as is shown in the illustration, this bolt being fitted with a wick oiler that affords positive lubrication, and the upper side of the offset is a seat for the butt end of the half spring, which is retained by a pair of U-shape bolts or clips, the ends of which pass through the offset and are secured by nuts and lock nuts. The half spring has six leaves, the end of the longest or master leaf having such clearance of the pad formed by the main spring saddle that when loaded, or when there is excessive spring action, the auxiliary spring absorbs the load in ratio to the deflection.

Unusual Spring Action.

The result obtained is the resistance of a longer and consequently slower acting spring than would be possible with a



Combination Frame Corner Reinforcement and Rear Spring Hanger Adopted for International Trucks.



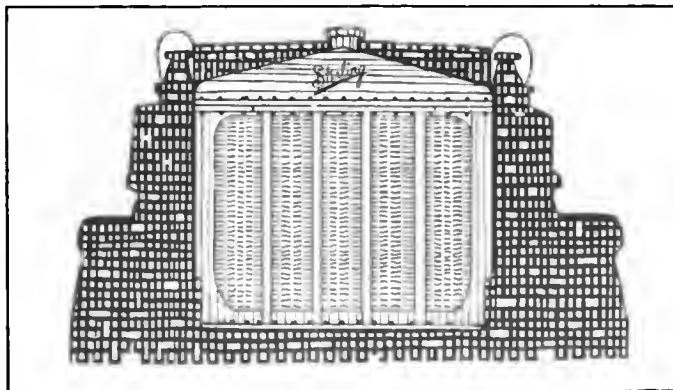
The Construction Units of the GMC Radiator Disassembled to Show Simplicity of Design and Interchangeability.

transverse jackspring or a supplementary spring mounted on the saddle of the main spring, and the stress upon the bracket is compensated, so that there is lessened strain upon the bracket as the load is increased. The effect is much the same as might be obtained with a short full elliptic spring when the load is heavy, and there is better distribution of shock than is possible with a transverse spring. As the rear end of the main spring is free and swings with the shackle, it only absorbs a part of the stress, the greater part of the load being taken by the forward end and the supplementary or cantilever section. The support is always at the side of the frame, and not in the centre, as with the transverse jackspring mounted on a frame cross member, and there is no twisting or distorting of the frame, which is inevitable when the cross frame jackspring is used. Besides this the support is well forward of the rear axle and this is a preventive of frame sag.

Another interesting development is the mounting of the rear ends of the springs, the brackets being placed at the corners of the frame, these serving not only as reinforcements, but replacing gussets. The rear frame member has exceptionally wide webs and is strong and heavy. The frame is carried at the corners, where there is the greatest support and there is the least probability of damage from distortion. The springs are free to yield and the load is well distributed over the entire rear end of the chassis frame. The brackets are large and the bolts are hardened and ground and provided with oilers so that they may be well lubricated, which insures efficient action.

Chevrolet Spring Shackle.

The rear spring shackles of the Chevrolet truck chassis are designed to obtain endurance and free action, the shackles themselves being a block type carried on a large webbed bracket that is comparatively light and yet has unusual strength. The bracket and the shackle block of each hanger is a steel casting, in each of which is cast a funnel-shaped oil reservoir that has a round orifice that is tapped and into which is fitted a winged screw. From these reser-



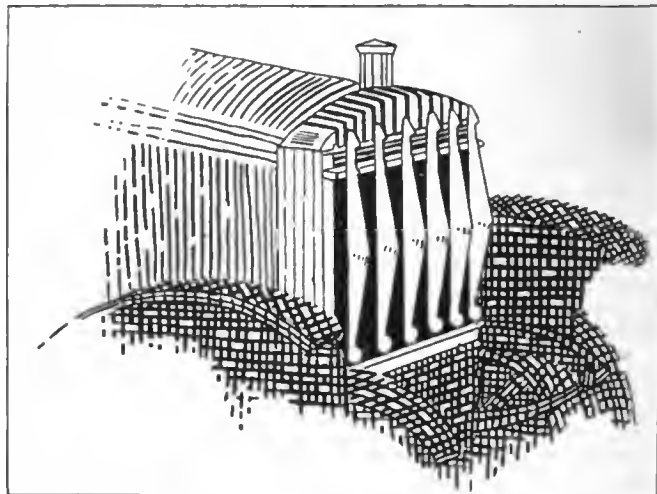
The Radiator Guards of Sterling Trucks Are Constructed with the Bars Forming a Part of the Frame.

voirs to the spring bolt bores are small channels that are fitted with wicks that feed the lubricant in volume that will adequately oil the bolts. The bolts are large and the bearings of the spring eye and shackle are the full length, and with full lubrication there is little probability of wear and there is certainty of action. The reservoirs may be filled occasionally and the shackles and bolts will not be neglected if not oiled daily. The spring bolts are grooved to carry more oil than would be possible had they the ordinary type.

GMC Built-Up Radiator.

The radiator on the GMC two-ton truck is a built-up type with a cellular cooling section, used with top and bottom tanks and side sections, that is assembled with two gaskets and a series of bolts. It has the qualities of not only being very rigid and practically immune against strains from chassis distortion that might cause leakage, but in the event of damage from accident it can be disassembled and any part replaced, for all of the parts are made interchangeable. The principle of interchangeability is not original, but the parts are very simple in design and replacement can be done by any mechanic with ordinary tools and in a comparatively brief period.

Because of the necessity of protecting radiators from damage from contact with objects against which they may be driven accidentally, some truck manufacturers have installed guards either in front of or incorporated with the coolers that are especially commendable equipment. A damaged radiator may necessitate the withdrawal of a machine from

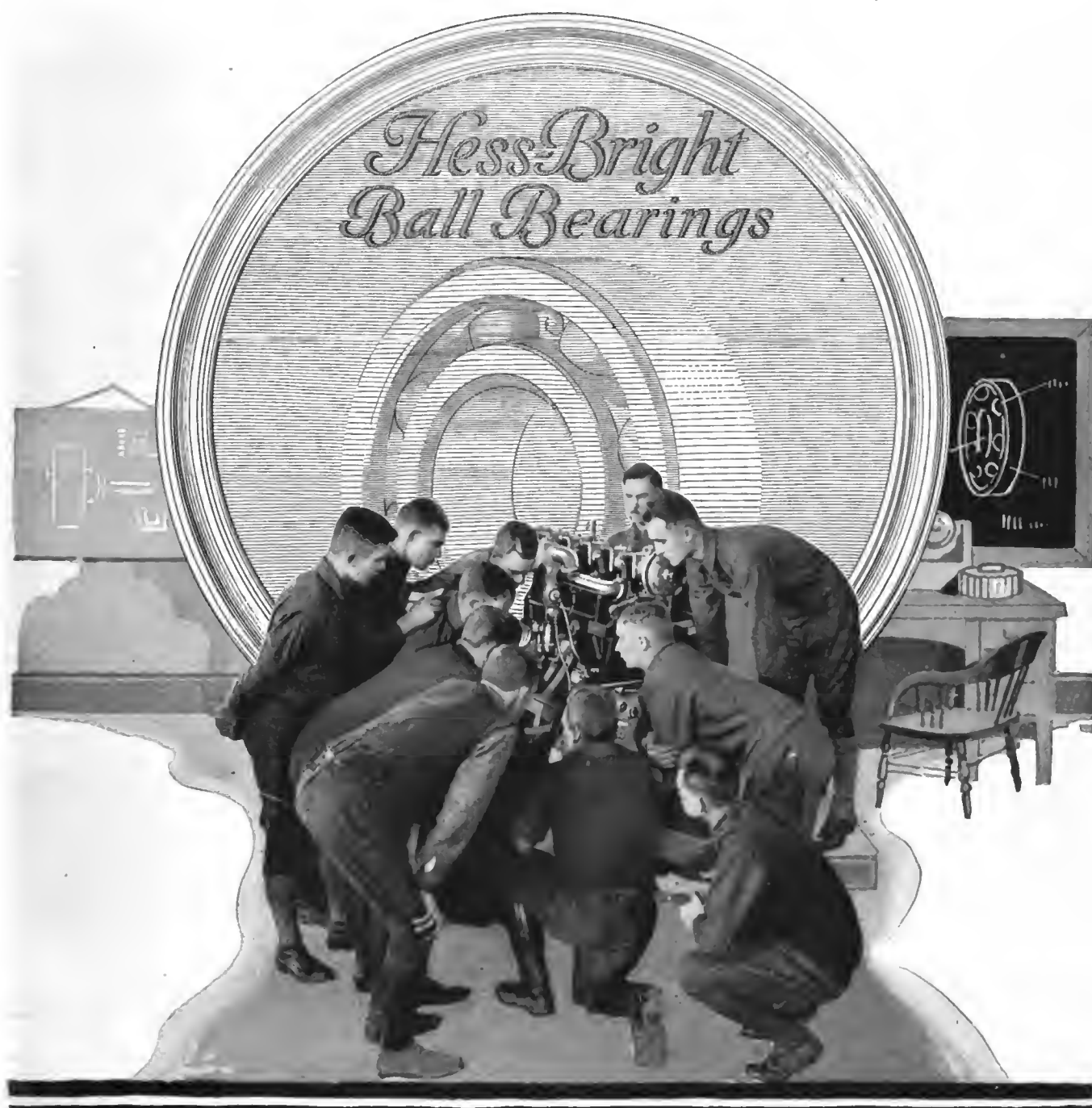


Signal Truck Radiators Are Protected by a Series of Guard Bars Bolted to the Top and Bottom Tanks.

service. Loss of time is costly, and if the use of the vehicle is imperative the rental of another to replace it is necessary. The easiest manner of continuing service is to replace the radiator, which can only be done by having a spare unit available. Such replacements are infrequent, but the time of accidents cannot be anticipated. With assembled radiators the damaged part can be replaced with comparatively little loss of time, and a spare cooling section is generally all that is needed. If the equipment is standardized one spare will suffice for a number of trucks.

The radiator of the Sterling trucks are assembled with a series of five vertical guard bars with flanged ends that are bolted to the top and bottom tanks, any one of which may be removed by taking out six bolts, and another bar can be installed by replacing the bolts. Such removal can be made without further disassembling the radiator, and the work can be done with a small wrench. The bars are sufficiently strong to resist a heavy shock and do not in any way affect the circulation of air or the efficiency of the cooling system.

The radiators of Signal trucks are similarly protected by series of six vertical pressed steel bars that have enlarged V shape centres, that are retained by cap screws at tops and bottoms. The bars have great strength and while comparatively light are a substantial protection. All can be quickly removed in the event of need and with a single tool. There is little reason to expect damaging accident with this form of guard.



Learning the lesson the bearings teach—

is an important phase of our air pilots' training. For during maneuvers in the air the lives of men or success of battles are staked against the integrity of an assemblage of metal parts—the ball bearings. That the Hess-Bright product successfully withstands the excess strain and stress in such service is a fitting testimonial of the choice of materials and care of workmanship used in

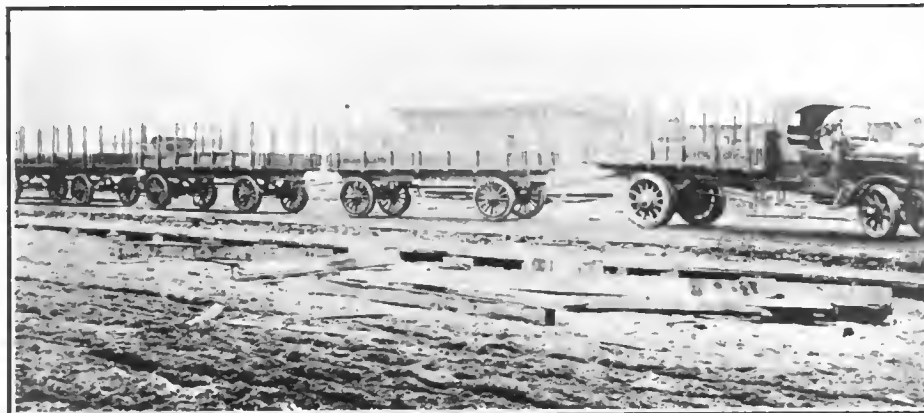
their manufacture. And there's a lesson in such performance for the motorist and truck owner. For the service so rendered makes the lesser strains of lighter usage a smaller matter. Hess-Bright reputation is based on bearings built to stand more stress, more rough treatment and less attention than you can give them. And that reputation is maintained by the manner of their making.

THE HESS-BRIGHT MANUFACTURING COMPANY

Where Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

Building Ship Yard With Acason Trucks



One of a Fleet of 32 Five-Ton Acason Trucks, Used for Tractors, with Train of Trailers at Hog Island Ship Yard Construction.

The Hog Island ship yard at Philadelphia, Pa., which is now being constructed by the American International Shipbuilding Corporation, under the direction of the Emergency Shipping Board, is designed with a view of producing many vessels in the course of a year, and the plan of operating is to have construction progressing on the largest number that can be worked on simultaneously.

The haulage and handling of material requires many vehicles of all kinds. Horses are used in large numbers, but the greatest part of this work is done with trucks. This is necessary for the construction does not cease. Hundreds of men work with these. The company has in its service a fleet of 32 Acason trucks of five-ton load rating that are used as tractors with trailers, these being operated to the three-unit principle, one series loading, one unloading and the third being hauled, so that the tractors are idle only when coupling and uncoupling the trailers.

In addition to these the company has three chassis equipped with special bodies, one of which is an armored pay car, a second is a commissary truck and the third is a "black maria" for conveying prisoners arrested by the 600 or more guards, special police and detectives who are constantly on duty to protect the buildings and material from damage or theft.

Some of the trucks are equipped with platform bodies and loads are carried on them to insure traction. Others are fitted with Lee unloading bodies and still others have Mead-Marsh hoists for quick discharge of loads. The tractors are operated with trains of trailers at times, depending upon the work and the necessity, for while roads have been built and plank ways have been laid, a large part of the surface of the ground is soft and always cut and rutted from the heavy traffic.

Besides the Acason trucks owned by

the company about 125 trucks are hired, so that not far from 150 machines are worked in and about the yard, and besides these the horse teams and trucks and carts. As haste is the main purpose the power trucks have not been spared. Not only are they used as nearly constantly as is possible, but they are

at times greatly overloaded, and on the soft ground in which traction is difficult they are subjected to strains and stresses that would seldom be realized in normal service.

The starting crank of one of the Acason trucks was broken and as a new crank could not be obtained nearer than the factory a new part was ordered by wire. The driver did not remember that the engine could be started at any time by towing, and as the truck was needed badly the greater part of the time he did not stop it when he finished work. When the crank was received the engine was kept running, and it was not stopped until it had been worked under load and idling for 504 consecutive hours, or 21 full days.

M. M. Clancy and Clement M. Enger have incorporated the Advance Motor Truck Co. at Wilmington, Del., with capital of \$2,000,000.

The Wohlrab Gear Co., Racine, Wis., is to erect a factory that will afford greatly increased production facilities.

MAKE RECORD OVERLAND TRACTOR-TRAILER TRIP.

What is probably the longest distance ever driven with a large tractor and semi-trailer was between Pontiac, Mich., and Mount Gilead, N. C., the outfit being sent from the factory of the Columbia Truck and Trailer Co. to a buyer in the North Carolina town. As the rated load capacity of the semi-trailer was 16 tons and the body was proportionate in size, the units attracted great attention. This was the largest semi-trailer ever sent from Pontiac. Shipping by railroad was not possible and the overland drive was the only way of making delivery.

FARMERS CONVERT CARS.

Statement is made through the automobile division of the Pennsylvania Highway Department in connection with registration of vehicles in that state, that a considerable number of farmers who owned cars have converted them for freight carrying or for service as tractors and are registering them in the truck or tractor classes. The types are small used machines that are not desirable for passenger service, but are too valuable to be disposed of for small prices and can be used very practically for delivery and collection or errand work.

COMFORT FOR TRUCK DRIVERS.

The Detroit chapter of the Red Cross has established a division that is devoting attention to the comfort of drivers of trucks who pass through that city, especially those serving in the army, and is distributing warm clothing and other necessities to them. The contributions are principally from local people.

Charles F. Millman, Edward R. Bacon and Benjamin A. Reese have incorporated the Horizontal Hydraulic Hoist and Body Co., at Milwaukee, Wis., with capital of \$50,000 to manufacture automatic dumping bodies and body hoists.

Robert M. Stanley has been made chief engineer and production manager for the Bourne Magnetic Truck Co., New York City.

When "Motor Truck" Does Not Reach You Promptly

Should your copy of **MOTOR TRUCK** not reach you the date you have customarily received it, please bear in mind that the transmission of mail is frequently delayed, and that scheduled delivery cannot be maintained, even with so thorough and complete an organization as the United States Postal Service. If you are inconvenienced do not forget that the condition is shared by others, and that we all must be patient until the time when transportation will be normal. This is only one of the innumerable burdens of war.

Ross Gears

THE merchant or manufacturer who knows and appreciates their superior quality in design, materials and workmanship, insists upon ROSS GEARS as steering equipment on the motor trucks that he buys. He has every reason to believe that the motor truck manufacturer who has been willing to pay a little more to give his customers the added assurance of safety, reliability and easy steering that ROSS GEARS guarantee, has probably given the same careful thought to the entire make-up of his truck. One hundred and fifteen different makes of motor trucks, representing considerably over half the industry, are steered by ROSS GEARS.

*Write for catalog and other
information desired*

ROSS GEAR & TOOL COMPANY
790 HEATH STREET - LAFAYETTE, INDIANA

*Manufacturers of the Steering Gears
that Predominate on
Motor Trucks*



(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

Truck Registration In Bay State

Although the winter is the period of the year when there is the least business activity so far as highway transportation is concerned, and this is especially true of the past winter, when extremely cold weather caused the suspension of all constructional operations, the registration of power trucks in Massachusetts has been distinctly surprising because of the large number.

Up to Nov. 30, 1917, the registration of trucks for the departmental year was 25,008, and up to April 1, with eight months to be completed, the registration of trucks was 22,955. During the same period the department registered 86,820 passenger cars, which was 10 per cent. more than was registered in the corresponding period of 1917.

The registration would appear to indicate that there will be exceptionally large increase of trucks operated in the state the present year, and as business men do not register machines unless they have use for them, a total of not far from 35,000 for the year is regarded as probable. The registration is also significant from the fact that trucks are difficult to obtain, practically all that are sold being driven over the road from the factories, and some of the plants are nearly 1000 miles distant.

One of the effects of the war is that there is a considerable decrease in the number of drivers' licenses issued, this being the first year that this condition has been noticeable.

Langdon A. Smith, formerly general eastern supervisor of the Maxwell Motor Sales Corporation, New York City, has been appointed assistant to T. J. Tener, director of sales for the Maxwell Motor Co. He will cooperate with C. E. Stebbins, who is also assistant to Mr. Tener.

WILLIAMS JOINS SELDEN.

The sales organization of the Selden Truck Sales Co., Rochester, N. Y., of which H. T. Boulden is director, has been augmented by C. E. Williams, who has been appointed assistant sales manager. Mr. Williams was for a considerable length of time connected with the Velle



C. E. Williams, Assistant Sales Manager, Selden Truck Sales Co.

Motors Corporation, Moline, Ill., in a similar capacity, and prior to that time was in charge of the sales promotion department of the Federal Motor Truck Co., Detroit, Mich. Mr. Williams is well known to a large number of the trade interests.

The Timken Roller Bearing Co. is now represented in Southern California by George C. McMullen, formerly assistant manager of the metal products plants of the Timken-Detroit Axle Co., with headquarters at San Gabriel.

License U.S. to Build Buda Engines

The Buda Co., Harvey, Ill., which specializes the manufacture of engines designed for power trucks and tractors, but because of the very large demand for its product has been unable to take proffered contracts, has licensed the United States government to build its model HU engines, which have been adopted as a standard for the duration of the war for certain government installations, through outside manufacturers.

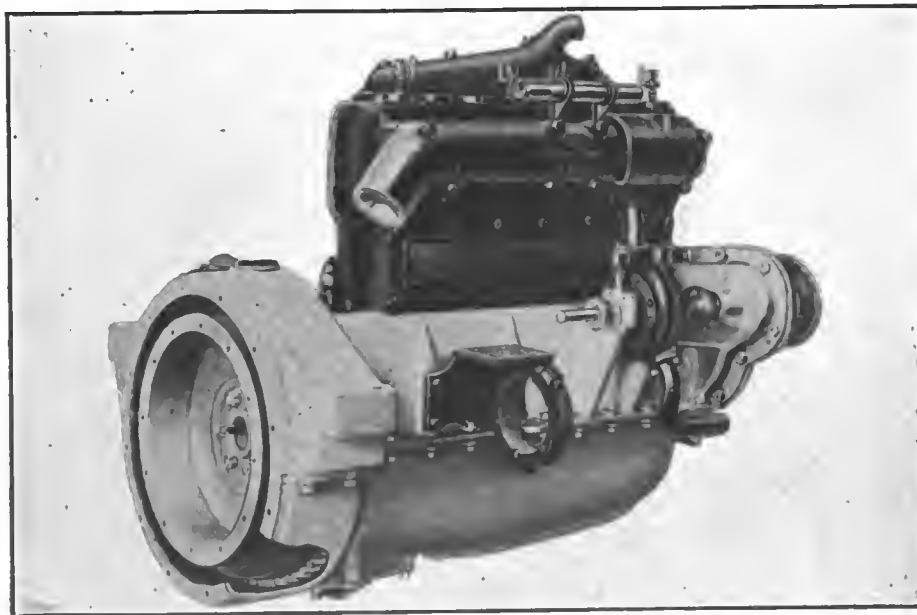
The model HU engine has cylinder bore of $4\frac{1}{4}$ inches and stroke of $5\frac{1}{2}$ inches the horsepower rating by the S. A. E. formula being 28.90. It has an extremely efficient system of lubrication. When the specifications for engines for government service were prepared the HU model, after several slight modifications in details that required no changes in essentials of design, was found to meet these fully, and contracts were submitted by the government for so large a number that these could not be supplied and the existing orders filled.

There was but one possibility—licensing the government so that engines could be built to Buda HU model design by other manufacturers for the exclusive use of the United States. This insured the government's requirements being met quickly and fully, because materials could be provided for those producing the engines, and the Buda company could also fill its other orders, which are vitally essential to its customers.

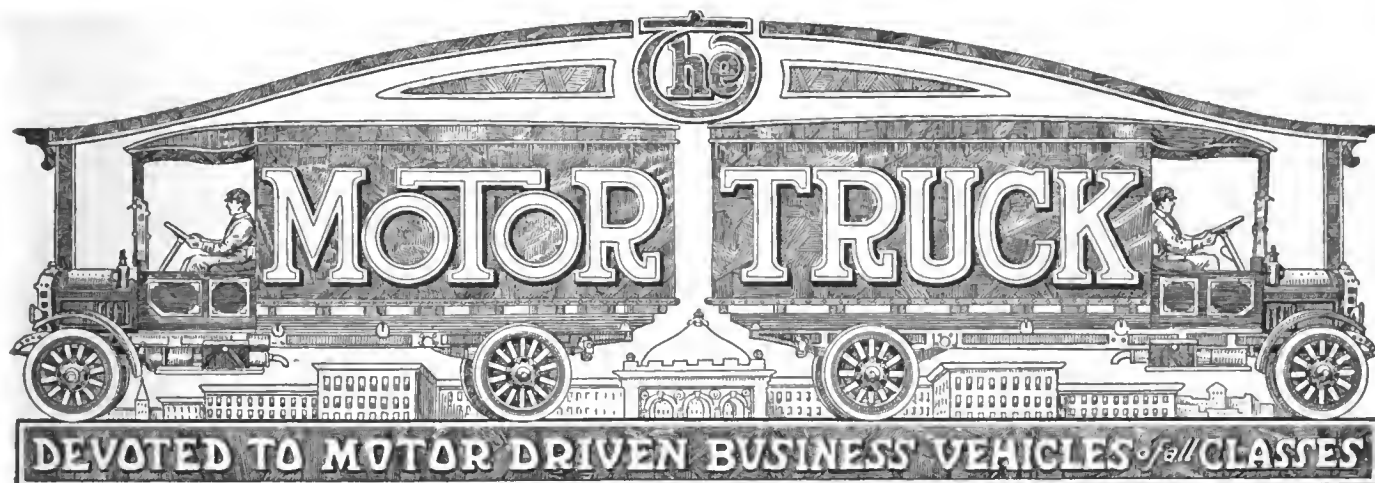
The broad minded policy of the Buda company was carried out and blue prints, patterns and whatever was necessary for the other manufacturers under the license to the government were supplied and production has been begun. The Buda company has the gratification of a standard type of engine being accepted as entirely satisfactory for government use for certain service, with the substitution of tungsten valve for cast iron head valves and a change in the crank case cover so that a wider fan belt can be used. The Buda company has manifested a fine spirit of cooperation with the government, for it has demonstrated that it has no desire to control the use or manufacture of a very dependable engine. The accompanying illustration shows the model HU Buda engine as modified to meet the government's need and which will be built by other manufacturers under the government's license.

F. W. Prothero has retired as sales manager for the Swedish Crucible Steel Co., Detroit, maker of Olson chassis conversion units, and has been succeeded by C. E. Lindsay, formerly manager of the company's branch at Windsor, Ont.

Henry Ford's subscription to the third issue of Liberty bonds was \$6,000,000, this being the largest individual subscription made for bonds in Detroit.



Model HU Buda Engine, Which the United States Government Has Been Licensed to Build in Other Plants During the War.



Vol. IX. No. 5.

PAWTUCKET, R. I.

MAY, 1918

FIFTY-MILE RADIUS DELIVERY

Hecker-Jones-Jewell Milling Company's Transportation Department Shows Efficient Service and Profitable Results—Standard Equipment of 15 Hurlburt Trucks—Cost System a Model of Great Simplicity and Accuracy

THERE is no other territory in the United States that so particularly exemplifies the absolute necessity of motor truck delivery and freight transferring haulage as that of Greater New York City. Here is congregated and congested a population of over 5,000,000, and the territory this vast population covers is approximately 30 miles long from the northern limit of the Bronx to the southern limit at Coney Island, and two to four miles wide at the Bronx and Manhattan Island, and 30 miles wide on the line from the west to the easternmost limit, embracing the sections covered by Staten Island, Brooklyn, Long Island City and Jamaica.

The general layout of the Greater New York City district is cut up into several districts segregated from direct transcontinental connection other than the service rendered by the railroad freight ferry boats. The accommodations for

transferring freight from the west side, or Jersey front, have been and are still so glutted, due to the exigencies of the war, that hundreds of commercial houses and manufacturers in the Greater New York City district have turned to the motor truck as their only relief. However, from New England points there is direct connection by railroad to Manhattan Island and to Long Island City and Long Island points, and this railroad service in normal times is ample to take care of a large volume of freight, but during these exceedingly stressful war times the system is greatly overloaded and quite inadequate to handle entirely the enormous amount of freight shipments coming into this greatest seaboard outlet of the American continent.

Motor Trucks Connecting the Congested Sections.

Large numbers of motor trucks are being continually employed in the Great-

er New York City district to connect the congested sections, which are divided generally by the North river (Hudson) and the East river. The territory separated by these two rivers is most economically and expeditiously served by motor trucks daily, delivering goods from the jobber and manufacturer direct to the dealer, there not being the exasperating delay that is inevitable by local freight delivery now when railroads are overtaxed by transcontinental shipments alone.

A railroad authority compiled a set of figures to show that it costs 80 cents more to handle a ton of freight in New York City than it does in Philadelphia, and that the cost of starting a ton of freight from the Jersey City terminal to the consignee's store is about 14 times as much as the expense of transporting the goods from Philadelphia to New York City. This authority's clinching compari-



A Line-Up of Eight Hurlburt Trucks, Part of the Efficient Fleet of 15 Hurlburts in the Delivery Service of the Hecker-Jones-Jewell Milling Co.

**SALIENT FACTS OF DELIVERY
SERVICE OF HECKER-JONES-
JEWELL MILLING CO.**

The equipment and organization permit the company to daily deliver its goods free to customers within a radius of 50 miles, saving freight charges formerly paid by customers and giving them quicker delivery and thereby cementing their friendship and holding patronage.

Fifteen Hurlburt Trucks serve 878 customers daily—

Averaging 252,864 deliveries annually.

Each truck averages 53 miles per day.

Average time in loading a five-ton truck at the mill, 14½ minutes.

80 horses employed on very short hauls.

Horse drawn trucks average 19 miles each per day.

Motor truck and horse delivery equipment cover approximately 1200 miles per day.

transportation expert, who has made a study of transportation problems for the past 20 years. He handled horse transportation problems in the great city for years, before motor cars and motor trucks were introduced as practical and economical. He was formerly general superintendent of a large motor transportation service for 10 years; later, for several years, he was engaged in the taxicab business, serving some of the largest hotels and clubs in New York City. Before entering upon his duties as the superintendent of the motor truck transportation service of the Hecker-Jones-Jewell Milling Co., he was engaged as a specialist with the management of John Wanamaker, to speed up and improve the large and complicated city and suburban delivery department of his large New York department store.

Mr. McDowell, although a very busy executive, consented to give to the representative of The Motor Truck an interview. He was generous in extending his aid and advice to motor truck users, and said he was convinced that it was worth while to give to truck owners and prospective owners some useful information that he has acquired concerning transportation problems, which he trusts will be of practical value to them. He is an enthusiast on the subject of motor truck transportation, and his experiences are more convincingly told by himself—so, here is his story:

**The Service Rendered by
Fifteen Hurlburt Trucks.**

"Our company has been engaged in the flour milling business for 70 years. Up to five years ago they made all their deliveries by horses and continually had as high as 75 teams on the job. Five years ago they commenced to use motor trucks to take the peak of the load off their horses and to gradually eliminate horse haulage, which they are doing more each year; although they still retain a considerable number of horses in their delivery service covering short distances. Our first fleet of motor trucks was made up of various leading makes and sizes, including some Hurlburt trucks. As this equipment had served its purpose we decided to standardize our equipment and selected the Hurlburt truck, as its performance during the previous five years demonstrated that it



EDWARD P. McDOWELL,
Superintendent of Transportation, Hecker-
Jones-Jewell Milling Co. The Cost Sys-
tem Illustrated and Described in This
Article Was Devised by Mr. McDowell.

is an economical and efficient truck. Four of the principal reasons we purchased Hurlburt trucks are: They are dependable and stand up under severe service; their upkeep cost is low; their flexibility makes it easy for our chauffeurs to handle them in the heavy traffic on our congested streets; and, their service department and stock of spare parts are at our convenient demand and the service rendered is exceptionally good.

"After selecting the Hurlburt truck we decided to have only two models. We ordered 13 of their five-ton trucks and two of their two-ton trucks. The five-ton trucks are used for our general deliveries and one two-ton truck for special deliveries, with the other two-ton truck used as our service car.

**Average Daily Distance
Covered, 50 to 90 Miles.**

"The products of the Hecker-Jones-Jewell Milling Co. are delivered direct to the trade, which includes stores and large bakeries. In serving our extensive trade, our trucks cover considerable territory within a radius of 50 miles of New York. The points of delivery and routes taken are shown on the accompanying map. It might be considered by many that with the number of railroads available in our particular territory, that shipment by rail would be preferable and more economical, particularly when it is considered that the trucks are empty and have no earning capacity on the return trip. Even with our trucks returning empty we have proved and know that they have made quicker deliveries than we can possibly secure by local railroad freight trains, especially during these times of general freight congestion and deliveries within a day or two very uncertain. Our trucks are able to deliver goods the day after ordered and in many instances they deliver them the same day they are or-

son of these differences in costs is that the haulage and terminal expenses are over 20 per cent. more than the cost of 1000 miles of rail transportation.

It is estimated that 40,000 vehicles are employed in handling merchandise from New York's west side piers and terminals alone and that a great number of these are there at the same time. That is the main cause of freight transfer congestion in New York City.

The conditions of the odd layout of the territory and the inadequate transfer service of the railroads compelled the great majority of merchants and manufacturers of Greater New York to quickly extend their freight transfer and deliveries of goods by adding more motor trucks. Consequently an enormous tonnage of all kinds of goods is being delivered by motor trucks direct to dealers within a radius of from 50 to 75 miles.

**An Efficient, Profitable
Example of Motor Haulage.**

One of the most exemplary systems of motor truck haulage in the Greater New York City district is that of the Hecker-Jones-Jewell Milling Co. Their motor truck transportation service is superintended by Edward P. McDowell, a



Loading a Five-Ton Hurlburt Truck with Bags of Flour from the Chute.

dered. Our profitable experience of delivery within a radius of 50 miles for the past five years sustains us in our favoring the motor truck for our particular delivery needs.

Ten Standard Routes in the Service.

"Although the territory is routed, the trucks do not maintain any well defined schedule of trips; that is, the same truck is not always employed to cover the same trip. We have practically 10 standard routes, these taking the trucks to New Jersey, with Paterson and vicinity the farthest outlying points. In Greater New York the machines cover the boroughs of Brooklyn, Queens, the Bronx and Richmond, and often travel 90 miles in a day, although the average is generally between 50 and 90 miles, depending upon the orders received and the goods to be moved. The trip is determined largely by the orders received by the shipping department and the load to be carried, and the assignment may be such that a truck returning from a trip to New Jersey may be sent with another load to points in Queens, or with an emergency order to points in the Bronx. This method has its advantages in that each driver and helper becomes thoroughly familiar with each route and the trade, and in case of illness or an accident the delivery system is not disarranged. Considerable time is also saved by delivering emergency orders, pleasing the customers with up to the hour service and filling in lapses of time when the trucks might be standing idle. The trucks are loaded at the platform of the mill, bags of flour being shot through chutes to the vehicles, while barrels and cartons are loaded from the platform. Our chauffeur and helper unload the goods and carry them into the store or bakery. Very often the men are obliged to make room for the flour and frequently carry it up or down stairs, all of which means a loss of time.

The Company's Machine Shop, Garage and Body Building Shop.

"Our company maintains its own garage at the mill, with two first class motor truck mechanics on duty during the day and another expert mechanic on duty during the night. We employ one mechanic for each block of five trucks, the average with most other concerns being one mechanic for every three trucks. We employ the 'stitch-in-time' method of keeping out trucks mechanically efficient. We have a very complete machine shop where any needed work on the truck can be performed daily or nightly. There are no regular periods assigned for an overhaul of the machines, the work and replacement of worn and broken parts being done as required. All of the trucks are thoroughly inspected every night by our night mechanic. We operate our own body building shop, where we build new bodies and keep in repair bodies in service, painting them and repairing tops and making new tops for new bodies. The work on our bodies is continually kept up to the standard of excellency both in

brightness of appearance and carrying stability.

"We have made possible the elimination of the railroad in the territory we serve, and the customer is given better service, as the cost of loading at the terminal and transportation to the consignee are eliminated. Our delivery service, within a radius of 50 miles, is free to the customer. It is a door-to-door delivery performed in one operation. In many instances the customer is able to replenish his stock on the very day the goods are ordered, and this constitutes real delivery service that is a profitable asset to any industrial plant. For instance, it would not be possible to deliver by freight train 50 barrels of flour within eight hours of the receipt of the order, and this is a performance regularly made by the motor truck delivery service of the Hecker-Jones-Jewell Milling Co. Their experience conclusively proves that motor trucks can be profitably and efficiently operated within a radius of 50 miles or more daily.

Competent Chauffeurs and Their Daily Reports.

"We believe in employing none but

the most capable drivers and prefer married men between the ages of 30 and 45. The examination of an applicant for a driver's position is rigid. The average driver would not measure up to the standard we maintain. The new man is sent over a route with an experienced driver and his method of handling the truck carefully noted. Drivers make out a daily report on a card, and upon starting on a trip enter the number of the truck, quantity of fuel and oil, load in tons, destination and time of departure. Upon the return the card must bear the record of stops made, mileage and time



Radius of Motor Truck Delivery of the Hecker-Jones-Jewell Milling Co.

ESTIMATE OF DAILY OPERATING COSTS OF HURLBURT CHASSIS.

Model	No. 1	No. 2	No. 3	No. 4	No. 5
Capacity in tons.....	1½ tons	2 tons	3½ tons	5 tons	7 tons
Price of chassis.....	\$2600	\$3500	\$4150	\$5000	\$6500
Interest 5%.....	.43	.58	.69	.84	1.08
Depreciation 20%.....	1.73	2.33	2.77	3.76	4.32
Insurance \$300.....	1.00	1.00	1.00	1.00	1.00
Garage.....	.67	.75	.75	1.00	1.00
Chauffeur.....	3.50	3.50	4.00	4.00	4.00
Gasoline, 60 miles, 28c.....	1.68	2.10	2.40	2.80	3.72
Oil.....	.30	.30	.30	.35	.40
Operating expense.....	\$9.31	\$10.61	\$11.91	\$13.35	15.52
Tire renewals, 7000 miles..	1.92	2.72	3.48	4.26	5.28
Total.....	\$11.23	\$13.33	\$15.39	\$17.61	\$20.80

This table of estimated daily operating costs of the several Hurlburt chassis was computed by the Hurlburt Motor Truck Co. It does not include the upkeep costs on bodies. On the basis of these costs any user or prospective user of this make of truck should be able to approximately estimate the cost of delivering daily so many tons of goods to as many customers he may have to serve. However, the costs must be governed by the character of the goods and conditions of the territory, but the figures given at least form an initial idea of approximate costs, in which the thousands of readers of The Motor Truck are deeply interested.

CHAUFFEURS' DAILY REPORT

AUTO NO. _____

ODOMETER MILEAGE _____

LEAVING GARAGE _____

ODOMETER MILEAGE _____

RETURNING TO GARAGE _____ DATE _____

GASOLINE

CONSUMED _____ GALS.

CYLINDER OIL

CONSUMED _____ QTS

TRIP NO	GIVE STREET NUMBER OR EXACT LOCATION OF FIRST AND LAST STOP ONLY	TIME OF ARRIVAL AT MILL	TIME OF DEPARTURE FROM MILL	TIME OF ARRIVAL AT CUSTOMER	TIME OF DEPARTURE FROM CUSTOMER	TIME OF RETURN TO MILL	TIME OF RETURN TO GARAGE	NUMBER OF STOPS	NUMBER OF MILES PER TRIP	NO OF TONS CARRIED PER TRIP
1.										
2.										

HAS ANY ACCIDENT OF ANY DESCRIPTION, OCCURED IN THE OPERATION OF YOUR CAR TO-DAY ? _____

HAVE YOU MADE A PROPER REPORT IN REGARD TO SAME ?

STATE CAUSE OF DELAYS

IS YOUR CAR OPERATING SATISFACTORILY ?

IF IT IS NOT OPERATING SATISFACTORILY

STATE NATURE OF TROUBLE

MENTION CAUSE OF ANY UNUSUAL DELAY WHILE ON THE ROUTE

REMARKS

SIGNED _____

HELPER

SIGNED _____

CHAUFFEUR

Size of This Form, "8"x11", Four Double Line Spaces Being Omitted. On the Back of This Card is Printed the "Information for Chauffeurs, Drivers and Helpers."

of arrival. These cards are signed by both the driver and helper and the data is entered on a special form sheet, which gives the record of the car's performance and its expense of upkeep for an entire month. This system of daily and monthly record enables us to ascertain the performance of each truck, as well as to note the efficiency of each crew.

"Our entire corps of chauffeurs, drivers and helpers, mechanics and inside help are 100 per cent. Americans, every one of them having purchased Liberty Bonds and Thrift Stamps.

"Our company maintains over 80 horses, and these are used on short hauls and to railroad terminals and piers, where, under the existing conditions the horse drawn equipment is more economical.

Information for Chauffeurs, Drivers and Helpers.

- 1.—Report to work on time. Bad time-keepers and timekillers are not wanted here. When unable to report to work notify garage office at once; when returning to work ample notice is required. If you change your address notify us immediately.
- 2.—Be familiar and comply with state and city traffic rules. Avoid congested traffic points if possible. Take ample room in following a vehicle ahead—take no chances. Safety first.
- 3.—Report all accidents in garage office as soon as possible, get names and addresses of all available witnesses. Accidents do not merely happen, they are caused. See that you do not make the cause. Overspeeding and reckless driving will result in your dismissal from our employ.
- 4.—Chauffeurs and drivers are held personally responsible for their loads and C. O. D. collections, and must tally their loads on and off. Receipts must be kept clean and dry. They must be turned in, without fail, at shipping office each day. Receipts for loads to be delivered the following day must be left in garage office at night. You must be sure you have all your receipts called for before leaving mill. If you are short, have your receipts changed before starting on the route, by the shipping clerk. Mistakes may be avoided if you see that the employee signing our receipts for his employer (for our merchandise) writes the name of his employer and also his own name underneath in full. We have had some cases where the store proprietor claims he did not receive our goods and the signature on our receipt was illegible, and sometimes not known to the store owner, who refused to pay for goods he claimed he did not receive, consequently we were unable to prove delivery. Therefore, before you leave the store, make sure that you have a proper and understandable signature.
- 5.—You are herewith advised that our customers must be treated courteously—avoid arguments. Telephone for instructions if you are in doubt as to what action you will take in event of a dispute.
- 6.—Chauffeurs' state licenses must be obtained before Feb. 1.
- 7.—Any employee who has a legitimate complaint will be given a hearing and suggestions for the betterment of our service will receive consideration.
- 8.—Employment by this company binds the employee to comply with our rules and regulations and ignorance thereof will not be accepted as an excuse for negligence or an omission.
- 9.—Employees who obey our rules and handle our equipment and merchandise competently are considered desirable men to retain and advance in our service.
- 10.—It is absolutely necessary that you keep an accurate record on your daily report card of time of arrival and departure from mill and customer, causes of delay, mileage, gas, oil and grease consumed and tons delivered. When several deliveries are made on one trip put down the time of arrival and departure of first and last stops only on report card.
- 11.—Drivers will see that the merchandise is properly protected in stormy weather, and when the trucks are loaded at night for delivery the following day, see that the cover is placed on top and at front of rack, convenient for watchman to spread quickly in case of storm.
- 12.—No outsiders are permitted to ride on our vehicles. They are to be used for the company's business only.
- 13.—In case of an unusual delay while on the route, or customers refusing delivery of goods, etc., telephone the shipping clerk, Orchard 1522. If you have motor trouble or car break down en route, telephone the garage, Orchard 2001, and give the telephone number from where you are talking. When your repair is completed by the mechanic or if you get it fixed before he arrives, be sure to telephone the garage before starting away. Chauffeurs are expected to make minor repairs on the route.
- 14.—Do not take the car out of the garage until you see the gasoline tank, oil reservoir and radiator are full, brakes hold, steering gear and horn are in order and lamps filled. Cars unsafe to run must not be taken out of our garage.
- 15.—Do not run motor without sufficient water in the radiator. If you have

- 16.—Chauneurs will be held responsible for the proper oiling and greasing of the car or cars they may be assigned to drive. No excuse will be accepted for failure to lubricate car.
- 17.—If the motor fails to start see that you have gasoline in tank and that it is flowing to the carburetor. Look at the ignition for loose connections, or for fouled spark plugs.
- 18.—If the motor gradually loses power, examine cooling system; see if water pipe or radiator leaks, fan belt slips, insufficient oil in crank case, lost compression, etc.
- 19.—If the motor misses look for defective or dirty spark plugs, an intermittent short circuit, water in gasoline, weak exhaust valve, leaks between carburetor and cylinders.
- 20.—If motor is feeble it may be due to carbon, valve leaking, lost compression, inlet or exhaust valves not working right, spark being weak, clutch slipping, or brakes binding. Don't attempt to adjust the carburetor or magneto.
- 21.—If carburetor catches fire, shut off gasoline at tank; if no fire extinguisher is available use sand or ashes—water will spread a gasoline fire.
- 22.—Fill gas tanks of cars from portable gas tank only.
- 23.—When a wheel is taken off at the tire service station see that a good cotter pin is put back in lock nut. Keep away from congested traffic points and particularly bad roads; when it is necessary to drive over them, drive slowly—this will reduce vibration. Do not scrape the curb. Keep out of car tracks. Running in car tracks throws the load on one side of the tread, which will rapidly break down the tread on the side of the tires thus abused. When chains are necessary, use them on both rear wheels; be sure that they are loose, and the moment street conditions permit, remove them at once. Avoid skidding, particularly with locked brakes; turn corners slowly at all times.
- 24.—Helper must stand on the ground in front of the chauffeur, to direct him in backing into his space in the garage, mill loading platform or other places. Put out all lights on your car before bringing it into garage.
- 25.—Be loyal to your employer and thereby be loyal to yourself.

"In case of accident, where damages might be claimed, we have forestalled the liability of having any fictitious evidence being trumped up against us, as to the good working order of any of our trucks, by using a daily inspection report blank. All of our trucks are thoroughly inspected daily by our night mechanic. This evidence to show that our trucks are in good running order has saved us quite a few thousands of dollars in damages, which, without the system, we might have had to pay.

CAR NO _____ WHEEL _____

Size of Form 7"x9½", Eight Lines Being O mitted. A Separate Form Is Used for Each Wheel.

6

Krebs Automatic Truck Engine Controller

By this is meant that the controller will open the throttle as wide as is necessary to maintain a given speed on a steep ascent, for instance, and when a level road is reached it closes the throttle. It will have similar control if the clutch is disengaged. Though the engine is started with the throttle open, it is never raced, for the controller will close the throttle when a moderate speed is attained, but the full power of the engine is available to bring the truck to the maximum speed for which the controller is adjusted. The claim is made that other types of controllers cannot be used for both high and low speeds because one spring that is stiff enough for high speeds is too stiff for low speeds. In the Krebs controller one spring is adapted for all speeds by changing its relation to the other parts of the governor.

The Operation of the Controller.

The operation of the controller is illustrated by drawings, the first showing the instrument set for high speeds, the second for low speed, and the third the controller variability. With reference to these the lever A controls the throttle and when it is in the position shown at C the throttle is closed, and when in that shown at O the throttle is open. The centrifugal force of the weights acting on a lever inside the controller case tends to close the throttle, but the force exerted is balanced by the pull of the spring. When the speed lever B is in the low speed position, shown in the second sketch, the spring is so close to the pivot on which the lever A oscillates that it has the effect of a very flexible spring, and in moving the throttle from the open to the closed position the spring is stretched much more than when in the high speed position shown in the first sketch. Because of this the comparatively slight centrifugal force, due to the high velocity of the rotating weights, is sufficient to operate the throttle over its entire range, from the open to the closed position. Were the spring pulling in the same direction as in the first sketch the centrifugal force would move the lever but very little.

Maintains Correct Automatic Control.

Claim is further made that besides controlling the throttle the Krebs controller maintains the only correct automatic spark control. When the engine is running with full load, that is, with the throttle open, a large volume of gas is drawn into the cylinders and diluted with the comparatively small volume of burned gas remaining in the combustion

chamber, and it is then highly compressed, forming a dense, quick burning mixture. When the engine is running with a light load, that is, with the throttle nearly closed, but a small volume of fresh gas is admitted, which is diluted with a comparatively large volume of burned gas and only slightly compressed, forming a slow burning mixture.

That the maximum pressure shall occur at the most advantageous point in the engine stroke the gas should be ignited earlier when the throttle is nearly closed than is necessary when the throttle is open, and for this reason the spark should be advanced as the throttle is closed. The Krebs controller is connected with the magneto so that the spark is advanced as the throttle is closed. By reference to the illustrations of the controller's action one will note that the lever B is moved toward the left as the speed is increased and the upper arm of the lever A moves toward the left as the throttle is closed. These levers are connected by rods to the ends of the timing lever L, which in turn is pivoted at its centre to the upper arm of the bell crank lever M. The horizontal arm of M actuates the circuit breaker of the magneto, advancing the spark as the lever moves downward.

Maximum Advance When Needed.

The maximum advance occurs only when the truck is being driven at high speed with a full load, as shown by the full lines in the first sketch. When a grade is being ascended, so that the full power of the engine is necessary, the controller opens the throttle and retards the spark to the position shown by the dotted lines of the first illustration. When being driven with a light load the spark is partly advanced, which position is represented by the full lines of the second illustration, but as the load increases the spark is further retarded, as is shown by the dotted lines of the second illustration. This action is further illustrated at the third sketch.

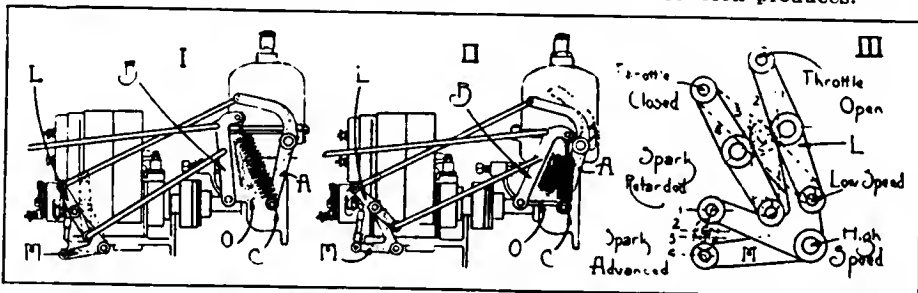
The claim is made that other automatic timing devices that adjust the spark position with reference to speed are not influenced by the changes in the load upon the engine. As the average truck driver is seldom an expert the spark lever is not often set at the position where the greatest power is realized. For this reason the fixed spark is sometimes adopted by manufacturers.

The Krebs controller is controlled exclusively by the Clyde Cars company and is only used as equipment for the machines that this concern produces.

Krebs Controller Showing Linkage,
Ready for Installation on Engine.

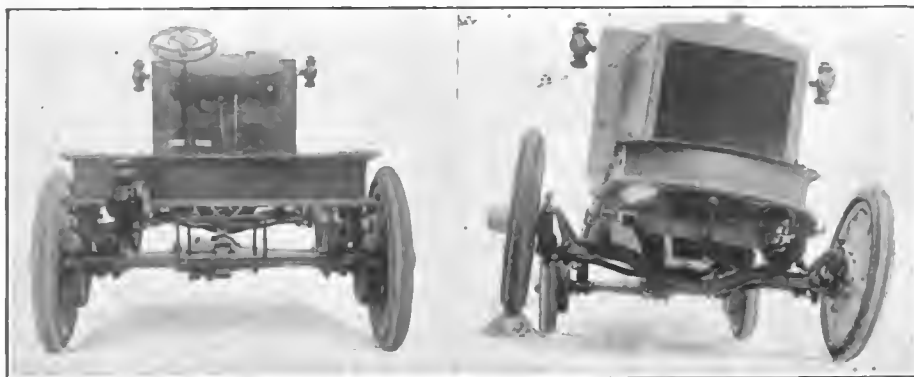
ECONOMY is of exceptional importance in the life of every person, either in private or business life. What will afford economies and efficiency now has greater value than ever before in the history of the world. All Clydesdale trucks, built by the Clyde Cars Co., Clyde, O., are equipped with Krebs automatic controllers, a device that by regulation of the flow of fuel gas limits the maximum speed, so that this limit is maintained whether the truck is on a level, ascending or descending grades. Claim is made that this is the only instrument that will absolutely control an engine at all speeds.

The controller is set for a given vehicle speed, which is attained with a specific number of engine revolutions, and while running at this speed were the clutch disengaged the engine revolutions would not be increased. The throttle is automatically closed during time the engine is unloaded, and when the clutch is again engaged the throttle will be opened until the maximum vehicle speed is attained. The controller is also a limit governor and may be set to prevent a driver racing a truck. The controller is located at the front of an engine, and its function is to adjust the time of ignition to meet every change in working conditions. The driver has no control of the vehicle except through the controller. He simply sets the speed lever at the mark he wishes to drive and the engine will do the work.



Krebs Controller Interconnecting Fuel Throttle and Magneto: FIG. 1, Position of Linkage at High Speed; FIG. 2, Position at Low Speed; FIG. 3, Variations Between High and Low Speeds.

STANDARDIZED TRAFFIC TRUCK



The New Traffic Two-Tonner—At Left the Rear End, and at Right the Front End with One Wheel Elevated to Show Flexibility.

PRODUCTION has been begun by the Traffic Motor Truck Corporation, St. Louis, Mo., of what is claimed to be the lowest priced truck of its load rating built in America, this being a 4000-pound chassis that is sold f. o. b. at St. Louis for \$1095. The company will produce but a single type, the manufacture of which has been standardized, and the extremely low price is based on the expectation of building 3000 trucks within the coming calendar year. The Traffic Motor Truck Corporation has \$800,000 capital and the officers include H. P. Mammen, president, formerly sales manager for the Westcott Motor Car Co., Springfield, O.; T. C. Brandle, vice president, president of the Brandle Motors Co., St. Louis; Guy Wilson, secretary-treasurer, formerly state manager for the Prudential Insurance Co. and the Missouri State Life Insurance Co.; E. R. Martin, engineer, formerly associated with the Marmon Motor Car Co. and the Westcott Motor Car Co. President Mammen has been identified with the industry for 15 years, having to do with manufacturing, distributing and selling, and Vice President Brandle developed a very large business as distributor of Westcott and Chevrolet passenger cars. Both are widely known. Mr. Wilson has had large experience financially.

Statement is made that the company has ample resources, is well organized and the factory has adequate facilities for producing to the manufacturing plan stated. The belief of the company is that there will be large demand for a truck of the size now building, and with the comparatively low price that there should be ready sale for all that can be built. The design was carefully developed and the experimental work extended over a considerable period of time, the purpose of the engineer being to obtain as low first cost as was practically possible, long endurance and minimum operating and maintenance expense. Much attention was given to obtaining simplicity and accessibility, that the construction units could be reached easily and attention given with the least labor possible. The design has been extremely simplified and the weight has been considerably reduced as compared

with other machines of similar load rating, the chassis weighing but 3300 pounds. The weight reduction has been through the use of high grade units and the elimination of all superfluous parts.

Constructed of Standard Units.

The machine itself is constructed of units that can be regarded as standard of the industry, these including a Gray engine, a Borg & Beck dry disc clutch, a Covert transmission gearset, a Russel internal gear rear axle, a Ditweiler steering gear, Carter or Kingston carburetor and Kingston high-tension magneto, and these are assembled with other units of equal quality and with a great deal of care to secure endurance. The power plant consists of the engine, clutch and transmission gearset assembled as a unit, that is carried on three points, so that it is fully protected against the stresses of chassis distortion.

The chassis has wheelbase of 133 inches and tread of 56, and the frame back of the seat is 122 inches long, this affording space for a large body without overhanging the frame. The turning radius is 26 feet and the road clearance is 12 inches, so that the machine can be utilized to good advantage on country highways.

The engine is built by the Gray Motor Co., Detroit, and it is a four-cylinder water cooled, four-cycle type, with overhead valves. The engine has cylinder bore of $3\frac{1}{2}$ inches and stroke of five inches, and it is rated at 19.60 by the S.

A .E. formula, but claim is made that it will develop approximately 35 brake horsepower at 1500 revolutions a minute, which is its maximum speed. Because of the gear reduction at the rear wheels the applied power output is comparatively large, and it is claimed to be more than will be required for any service. Another factor of considerable importance with reference to power production is that the valves are the overhead type, with ports $1\frac{1}{4}$ inches diameter, these having clearance that insures complete scavenging and full charges of gas at all times.

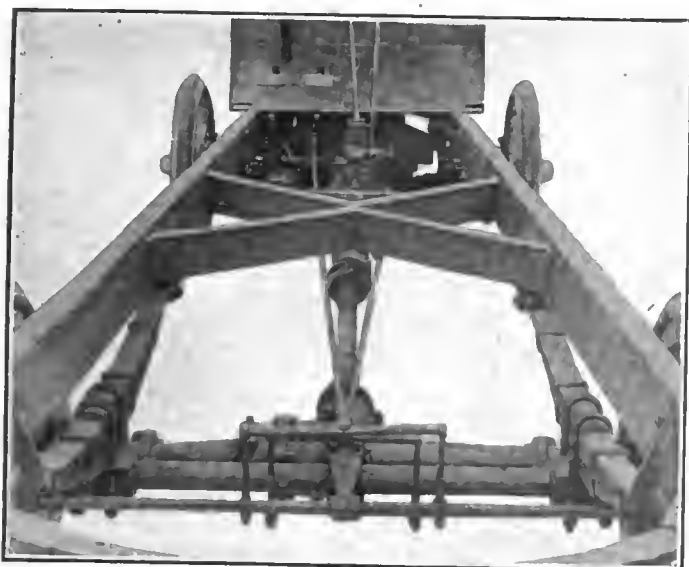
The cylinders are cast en bloc, with the water jacket integral, and the head is detachable, this affording easy access to the water jacket chambers and to the cylinders in the event of need. The crankshaft is a three-bearing type, of large proportions, and the camshaft is also mounted on three bearings. The crank case is in two sections, the upper half being divided transversely by a central web that carries the center main bearing, and the lower section serves as the oil reservoir. Both sections have front and rear extensions that form the housings for the timing gearset and the flywheel. The fuel intake is at the right side and the exhaust at the left, and the water inlet manifold is so placed that the cooling liquid is distributed at the base of the water jacket.

Engine Cooling and Lubrication.

The engine is lubricated by a combination pressure feed and splash system. The oil is drawn from the reservoir into a screened well by a gear driven pump and is forced through tubes to the main bearings and the timing gearset. The cylinders, pistons, connecting rod ends, wristpins, camshaft bearings, cams and valve tappets are lubricated by the splash of the big ends of the connecting rods in the oil pools in the base of the crank chamber. The engine is cooled by a thermo-syphon circulation of water through the cylinder jackets and a large St. Louis radiator, with cellular cooling section and sheet metal case. The water manifold outlet and inlet are two inches diameter, which insures freedom of movement of the wa-



Side of the Complete Traffic Truck Chassis with the Equipment Usually Supplied. Ready for Installation of the Body.



Rear Section of the Traffic Truck Chassis Frame, Showing the Unusual Placing of the Channel Section, the Cross Members and the Spring Suspension.

ter. Radiation is also promoted by a four-blade steel fan that is mounted on an anti-friction bearing carried on an adjustable bracket ahead of the cylinder block, that is driven by a flat belt from a pulley on the crankshaft. The fuel is supplied through a Carter or Kingston carburetor, either of which is an automatic float feed type, from a cylindrical pressed steel tank of 15 gallons capacity installed on the dash. The ignition is by a Kingston high-tension magneto that is equipped with an impulse starter to obtain easy starting, and which is controlled by a hand lever on the steering wheel. The engine is mounted on three points and the radiator is installed so that it will be free of strains from chassis distortion.

The clutch is a Borg & Beck dry disc type, constructed for truck service, that is claimed to be extremely efficient and which is fully enclosed and protected. It requires lubrication very infrequently and is easily accessible for inspection or adjustment. This is assembled with a transmission gearset built by the Covert Gear Co., which has large shafts and gears of $3\frac{1}{2}$ per cent. nickel steel, carried on large annular bearings, that has

three forward speed ratios and reverse. This is a standard unit designed specially for truck construction and is proportioned to have extreme endurance.

The drive from the power plant is through a large tubular shaft having two sections and three universal joints, the rear end of the first section being carried in a self-aligning annual ball bearing mounted on a substantial cross member of the chassis. The forward section is practically in a straight line, and there is very little

angularity of the rear section when the chassis is loaded. The rear end of the second section is coupled to the pinion shaft of the Russel internal gear driven rear axle by a universal joint. The Russel axle consists of a round section dead axle, the ends of which are the spindles on which the rear wheels are mounted.

On this axle are the large flanges on which the brake shoes are installed, and which enclose the internal ring gears and pinions by which the wheels are driven. The flanges also support the outer ends of the housing of the jackshaft, which is carried ahead of the dead axle, and which enclose the pinion shaft, the pinion, the master gear and the differential gearset. All of the load is carried by the dead axle and the jackshaft drives the wheels.

Because of the large gear reduction at the wheels the differential gearset is comparatively small and the power transmission system is light, for the power is obtained by speed. The dead axle is $2\frac{1}{4}$ inches diameter, of chrome nickel steel, carefully heat treated. The gears are drop forged from special steel and are heat treated and ground to exact proportions. The wheel spindles are

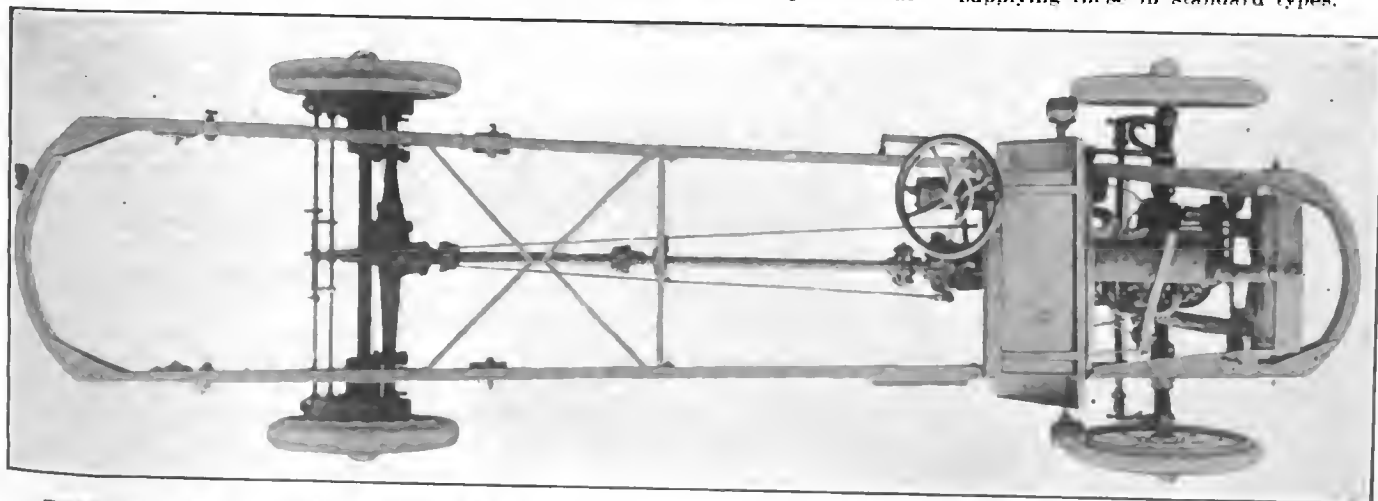
equipped with roller bearings of large size. The front axle is a steel drop forging of large size with heavy steering knuckles, the spindles being fitted with Timken roller bearings.

Frame and Other Chassis Details.

The frame is a pressed steel channel section, the members being formed with the webs outward, and the front and rear end members are curved, the former being of a more pronounced arc, so that it serves as a bumper to protect the radiator and engine. The shape of these is shown in an accompanying illustration. These members are joined by heavy gusset plates, and the frame has two other cross members, one of which carries the forward end of the power plant, and the other the rear end of the forward section of the driving shaft. Back of this last mentioned cross member are two diagonal members that securely brace the frame, but do not prevent it "weaving" under stresses.

The frame is carried on semi-elliptic silica-manganese springs, the rear set being under the side members. The Hotchkiss system of driving has been adopted, there being no radius rods. The spring bolts and shackles are large, the bolts being hardened and ground and the shackles and hangers and bolts are fitted with oil cups. The axles are equipped with wood artillery type wheels with square spokes, shod with Fisk pressed on type tires, 34 by three-inch front and 34 by four-inch rear. The steering gear is a worm and nut type, with means for adjustment, the steering post, with an 18-inch hand wheel being at the left side of the chassis.

The control is by foot pedals for the clutch and service brake, with a foot accelerator, hand ignition and throttle levers on the steering wheel, and gear shifting and emergency brake levers in the center of the footboard. The brake shoes operate on and in steel drums on the rear wheels 14 inches diameter and $2\frac{1}{4}$ inches faces. The chassis is sold as illustrated, with oil dash and tail lamps, horn, jack and set of tools. No provision has been made as yet for supplying body equipment. The company will undoubtedly make provision, however, for supplying these in standard types.



Top of the Complete Traffic Chassis With out Footboard or Driver's Seat, the Power Transmission System, the Russel Rear Axle and the Unusual Frame Construction Being Shown.

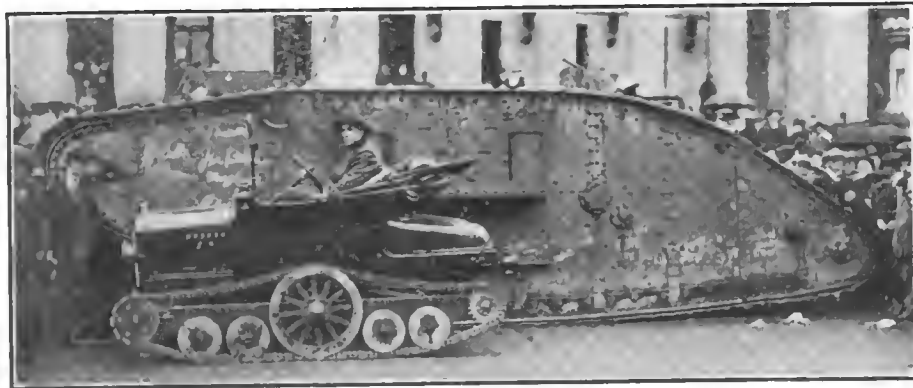
Martin Tries Out a Two-Man Tank

Charles H. Martin of Springfield, Mass., inventor of the Martin tractor and the Martin rocking fifth wheel for coupling tractors and semi-trailers, has produced what may be regarded as a means for converting Ford car chassis into track-laying tractors, that appears to be extremely practical. Mr. Martin made no claims for his machine before demonstrating it, but he appeared before the public in a manner that undoubtedly directed attention to it.

To stimulate the sale of Liberty Bonds and previously to that to interest British subjects in this country in recruiting, an English army war "tank" is being driven about in the principal cities of the eastern part of the country. Usually the tank is driven in parades and, if time will permit, it is charged across rough ground, ditches, and, perhaps, through walls or old buildings, or other seemingly impassable obstructions.

The tank is known as "Miss Britannia," and when it was in Springfield the crew left it in the street while lunching. On return Mr. Martin was awaiting the soldiers with a part of a Ford car chassis that had been converted by installing tracks that were driven by the rear axle, which had been fitted with sprocket wheels. The details of the construction are not stated, but the general appearance of the "two-man" tank, as Mr. Martin terms his creation, is shown in the accompanying illustration.

The British soldiers were not inclined to take the "toy" seriously until they found that with it Mr. Martin went in and out of all places and over all obstructions that they went with the war tank. Mr. Martin's purpose was to compare the "two-man" tank with the other to obtain suggestions for development. He maintains that the "two-man" type will go any place the war tank will go, in places where the larger machine cannot go, and that it is much faster. On the chassis was a Ford runabout body so that any ideas of armoring and arming were not disclosed. The machine would be equipped with a machine gun and when well armored would be a very practical field service unit.



Ford Runabout Converted Into a Tractor Unit Driven Beside the British Battle Tank Britannia at Springfield, Mass.

STUDEBAKER SALES CHANGES.

The Studebaker Corporation, South Bend, Ind., has appointed R. H. Williams, formerly manager of its Detroit branch, assistant to L. J. Ollier, director of sales and vice president; J. E. Grady, sales manager of the Studebaker Corporation of Canada, Ltd., manager of the Detroit branch; S. A. McGonigle, formerly manager of the automobile division at South Bend, assistant to Mr. Grady; L. A. Keller, former manager of branches at Omaha, Neb., Portland, Ore., and Los Angeles, Cal., manager of branches; George L. Williams, advertising manager, manager of the wholesale branch at Chicago and director of distribution in the Middle West; A. J. Brechtel, assistant for two years to the truck division, manager of the Des Moines wholesale branch; Percy E. Newell, formerly assistant general manager of the automobile division of the company, assistant manager of the district sales organization, with headquarters at Cleveland, O.

NEW KISSEL AGENCIES.

New agencies for Kissel trucks and cars are announced as follows: Chase Automobile Co., 908 Hennepin avenue, Minneapolis, Minn.; Boles Bros., Beeman, Mo.; Lininger-Alsop Co., Inc., Richmond, Va.; S. L. Bailes, Anderson, S. C.; O. T. Johnson, Browning, Mo.; Schneider Coal and Hay Co., Atchison, Kan.; J. C. Gutton & Son, Eldorado, Ill.; Master Motor Co., Des Moines, Ia.; G. W. Moffitt, Joplin, Mo.; Jackson Motors Co. of Missouri, 1727 McGee street, Kansas City, Mo.

ADDITION TO PAIGE PLANT.

In preparation for the operation of its truck department the Paige Motor Car Co., Detroit, is to make two additions to its administration building, which will afford approximately 50 per cent. floor space, which will be adequate for the anticipated requirements of the office force.

A manufacturing company is being formed by Charles G. Bohn, who after connection for a number of years with the Aluminum Castings Co., Cleveland, O., has resigned.

State Guard's Auto Hospitals

The federalizing of the National Guard units of Massachusetts led to the formation of a military organization that will have practically the same duties, so far as the protection of life and property are concerned, as the militia commands that have been amalgamated with the United States army. This new command is known as the State Guard and it is officered and equipped as was the National Guard, but, of course, while all equipment is practically new, some of it has been obtained with a view of better preparing for emergencies that may arise.

The state has appropriated funds for equipping and maintaining the State Guard and authorized an expenditure for two automobile hospitals. The units were designed, so far as the bodies are concerned, by Dr. William A. Brooks, surgeon general of the state forces, and these were installed on two two-ton Pierce-Arrow truck chassis that were supplied by the J. W. Maguire Co. of Boston.

The purpose is to use the auto hospitals in service with the guard. The interiors are divided into three compartments, provision being made for running water, sterilizing instruments, making hot coffee and heating liquids or materials of any character necessary in connection with surgical treatments. Major operations may be performed and six dressings may be made at the same time in either body. Of course the bodies are equipped with lockers and cabinets and racks that may be necessary for efficient work of the surgeons. The entrances are at either side and by removable steps. In many ways they are radically different from anything previously built and are intended to meet the requirements of modern surgery and emergency hospital treatment.

The use of truck chassis was regarded as necessary because of the comparatively heavy bodies and equipment, and the necessity of having machines that could be depended upon for service more or less remote from hospitals. The units after acceptance by Surgeon General Brooks, were inspected by Gov. McCall and other officials of the state government. Incidentally statement is made that similar auto hospitals would be extremely practical for every state militia organization now in service.

SANFORD TRUCK AGENCY.

The Sanford Motor Truck Co., Syracuse, N. Y., has made contract with the Painter-Dunn Co., Centre and Millvale avenues, Pittsburgh, Pa., for the agency for Sanford trucks for Western Pennsylvania. The Painter-Dunn Co., is one of the leading dealers in passenger cars and is expected to be a large distributor in the section in which it operates.

COLUMBIA SALES MANAGERS.

Announcement is made by the Columbia Truck and Trailer Co., Detroit, Mich., of the appointment of H. W. English, E. H. Hahersham and A. H. Pearsall as district sales managers, the first for the Pacific Northwest with headquarters at Spokane, Wash.; the second for the southern states east of the Mississippi river, with headquarters at Baltimore, and the third with headquarters at Chicago. Mr. English was for several years associated with Republic Motor Truck and Mr. Pearsall was with the Studebaker Corporation up to Jan. 1 as branch manager at Chicago. All the three are well known to the power truck industry and the trade.

HAUL SUPPLIES WITH TRUCKS.

A five-ton truck is operated by the Fuller & Sons Manufacturing Co., Kalamazoo, Mich., between its plant and the principal sources of supplies of materials, hauling capacity loads. Because railroads are exceedingly slow truck haulage has been resorted to and several long distance trips have been made, the freights being hauled at practically the same cost as expressage and in much shorter time. The company believes that had a trailer been hauled nearly as good time could be made and the cost would have been reduced in ratio to the increase of the load. The company now plans to use a trailer with the truck for the long hauls.

POWER TRUCK AND TRACTOR CO.

Construction of power trucks of 2000, 4000, 7000 and 10,000 pounds load capacities is to be begun by the Power Truck and Tractor Co., incorporated at Detroit, Mich., with capital of \$2,500,000. The manufacturing plan is to assemble trucks from well known standard units, and in addition two sizes of farm tractors will be built. The company has acquired a factory in Detroit and purposes to produce 3000 trucks and 3000 tractors within the year. Statement is made that the 2000-pound truck has been tested for a year and a half. No statement has as yet been made relative to the executives of the company.

MARWIN MOTOR TRUCK CO.

The plant of the Skidd Manufacturing Co., Kenosha, Wis., has been bought by the Marwin Motor Truck Co., which was recently organized under the laws of Delaware with capital of \$1,000,000 to engage in the manufacture of power trucks and tractors and operations will shortly be begun.

J. T. Garrity, assistant general manager of the Hartford Auto Parts Co., Hartford, Conn., has enlisted and is now at Camp Upton, Yaphank, N. Y. Statement is made by the company that 60 per cent. of its original office force is now with the colors.

TRUCK SALESMEN'S HAND BOOK.

Charles E. Stone, power truck and transportation engineer, Detroit, Mich., has published a small volume under the title of "Stone's Motor Truck Hand Book for Salesmen." The book is largely made up of data of weights and dimensions of materials and commodities, containers, cases, etc., much of which is new. This has been carefully revised and checked and can be depended upon as accurate. It is extremely useful determining adequate body measurements and haulage requirements. In addition the book contains all mathematical formulae necessary to determine capacity and load ratings of trucks, for both foreign and domestic markets. The little volume can be used to great advantage with a salesman's data book.

EASTERN DART DISTRIBUTOR.

The Maxim Trading Corporation, of which C. K. Thomas has been made general manager, has contracted with the Dart Motor Truck Co., Waterloo, Ia., to distribute Dart trucks in New York, New Jersey, Eastern Pennsylvania, Delaware and New England, and for export. The Maxim corporation will establish service stations in New York, Boston and Philadelphia, and perhaps in other cities. The executive offices will be at 120 Broadway, New York City. Until about Aug. 1 W. L. Bodman will serve as general advisor of the company.

INTERSTATE WILL BUILD TRUCKS.

The manufacturing plans of the Interstate Motor Co., Muncie, Ind., have been determined and for the period of the war the plant will be devoted to the production of trucks of 2000 and 3000 pounds capacity. Later on the resumption of passenger car manufacture is anticipated.

The name of the Hamilton Motors Co., Grand Haven, Mich., builder of Panhard trucks, has been changed to the Panhard Motors Co., the better to identify the concern with the trade name of its trucks.

Truck Saved Sheep Ranch Stock

Western sheep ranchers having large herds must find pasturage for their stock and for this reason must migrate from place to place during the year. The sheep will eat practically any vegetation and as the herds move they very thoroughly clear the ground of grass.

All ranchers expect to lose more or less stock from low temperatures and lack of feed, and in very severe winters losses have been as high as 35 per cent. For years sheep ranches have used horse or mule wagons to accompany their herds, but the Cow Creek and Pioneer Sheep Ranch Co., a concern operating in Wyoming, bought a White truck for the use of Roy Eversoll, its superintendent.

As his work was away from the ranch a considerable part of the year, Mr. Eversoll equipped a wagon with a permanent top and fitted it for use instead of a tent, intending to save time and have better shelter than he would otherwise have in the average camp. The wagon was drawn by the truck and located wherever desired.

The value of the truck was not realized until the beginning of last winter, when the severity of the weather necessitated feeding the sheep a large part of the time. On the range was 33,000 sheep, and these were fed in part with oil cake hauled with the truck from the ranch storehouse to where the animals were wintered. A considerable part of the time the truck was driven by Mrs. Eversoll, who, with her husband, lived in the trailer. When the weather was intensely cold the work was even more exacting because the animals were in greatest need of food, and through blizzards and deep snow, breaking paths for many miles, she drove the truck. The utility and economy of the truck for this work was shown by the fact that the loss of sheep was under three per cent., much less than might ordinarily be expected in average winter conditions. In the accompanying illustration Mr. Eversoll is shown beside the truck and Mrs. Eversoll is standing in it, with a herd of sheep in the foreground.



White Truck and Trailer Used as Camp by Supt. Eversoll of a Wyoming Sheep Ranch and Driven by His Wife During Winter to Haul Stock Feed.

HEAVY-DUTY COUPLE-GEAR TRUCK

Two-Wheel Drive Type Designed to Give High Grade Low Cost Service

WHAT is claimed to be the best designed and developed heavy duty electric truck chassis built is produced by the Couple-Gear Electric Truck Co., with offices and factory at 179 Front street, Boston, a concern that is eastern New England distributor for the Couple-Gear Freight Wheel Co., Grand Rapids, Mich. This concern was recently organized to build these trucks, the first of which was displayed at the Boston show, and they will be constructed to order only, for the purpose is to specialize a type that will be adapted for many works, but which will not for a considerable period of time be sold as are those commercially distributed by power vehicle manufacturers generally.

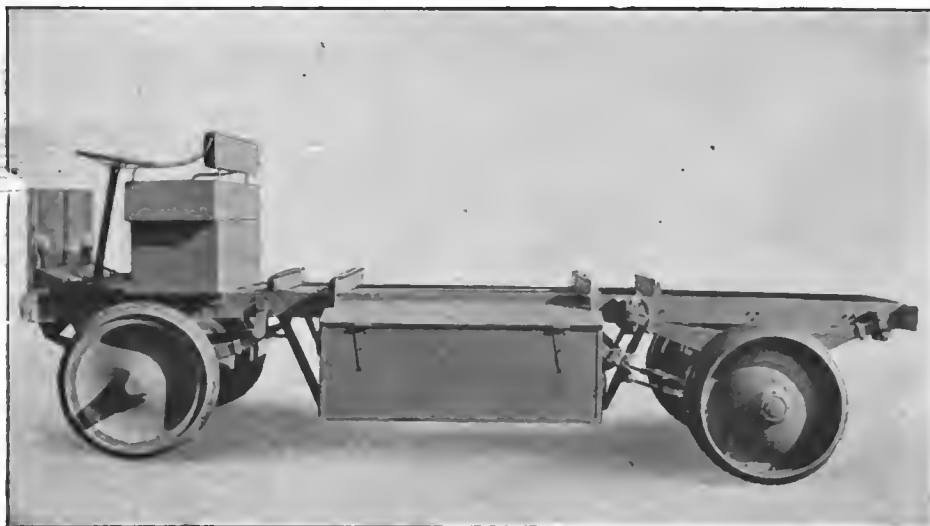
The truck itself does not reflect radical design, but as a whole may be regarded as an extremely simplified type in that large load rating, unusual endurance and very low construction and operating costs are obtained. This does not mean that the truck is cheap, or has been cheapened in the sense of quality, but initial expense has been minimized by

The Couple-Gear trucks have all been driven by Couple-Gear wheels that consist primarily of an electric motor that is mounted on a stub shaft that is assembled with the rear axle. This motor is contained in a special housing that carries the field coils, the commutator and the rear end of the armature being open. The ends of the housing carry the bearings on which the armature is mounted. The ends of the armature shaft extend beyond the housing, and on the ends are small steel pinions that mesh with racks that are retained by the wheel rims and which are maintained in relation with the pinions by steel discs mounted on the axles, which fit the rims and completely enclose the motor, pinions and rack.

Wheels Driven by Two Pinions.

Couple-Gear wheels are driven by the pinions meshing with the racks, one pinion contacting with a rack on the outside of the wheel and the other with the rack on the inside. Were the pinions meshed with racks on both sides with the armature shaft they could not be revolved, as when power were applied the drive would be applied equally in either direction. Meshed at either end on opposite sides the drive of the motor is in one direction. For starting a device known as an "evener" is included in the armature shaft, which serves the same purpose as a differential gearset, affording the necessary flexibility or yield, so that there is no extreme stress upon the shaft or gears.

In the new truck, which is specified as model 58, a new type of wheel is used that has a four-pole motor with a rating of five horsepower according to railroad standards, and which can for a short period be given approximately 200 per cent. overload, so that in the event of need each motor can develop 15 horsepower, or 30 in all, which compares very favorably with the power developed by gasoline engined trucks. This is the first truck in which wheels of this size have been used. All Couple-Gear wheels previously built had two-pole motors, rated at three horsepower each, and four driven wheels were used with each truck, the advantage claimed being that such construction afforded positive traction at each wheel and that whatever energy was required was



Chassis of 11,000-Pound Load Capacity Two-Wheel Drive Heavy Duty Machine Built by the Couple-Gear Electric Co., Boston, Mass.

using the smallest number of parts that is practically possible. As a matter of fact the only moving parts are two Couple-Gear motors that are housed in the rear wheels, the front wheels and the steering mechanism. As the motors are directly coupled there are no shafts or other driving members, differential gears, or chains or sprockets, and the energy is obtained from a large battery that is underslung from the chassis frame between the front and rear wheels, approximately centred between the centres of the front and rear axles.

Truck Driven by Two Rear Wheels.

The truck is driven by the rear wheels only, which is departure from the practise of the machines constructed with Couple-Gear units. There may not be general knowledge that the Couple-Gear Freight Wheel Co. has for years built construction units with which it assembled a limited number of trucks, but it has also sold these units to truck manufacturers or others who assemble machines to their own designs. The company has specialized the production of wheels and a "bridge" type axle that is not only light, but exceptionally strong. It has also produced a special generator that is used with a truck type gasoline engine to generate electric current instead of using a secondary or storage battery, this producing current in ratio to engine speed.

automatically applied.

There was maximum cost with four driving wheels, because of the four motors, so that the price was necessarily higher than for other vehicles driven with two rear wheels, and that the cost of trucks might be lessened and still have all the power needed for heavy duty the new type wheel, with 67 per cent. higher rating and with changes that make for increased efficiency was designed. This new wheel does not differ in principle from the smaller type, but greater endurance is insured by the use of annular ball bearings of large size for mounting the armature shaft, instead of plain bearings, the commutator of the motor has been made larger, a new type brush holder has been adopted and the housing has been redesigned. In addition to this the hub of the wheel, which revolved on a stub axle, has been installed on large Timken roller bearings, one at either side, so that all of the radial load, as well as the thrust, is taken by the bearings. As these bearings are adjustable compensation may be made for wear whenever there is need.

Function of the "Evener."

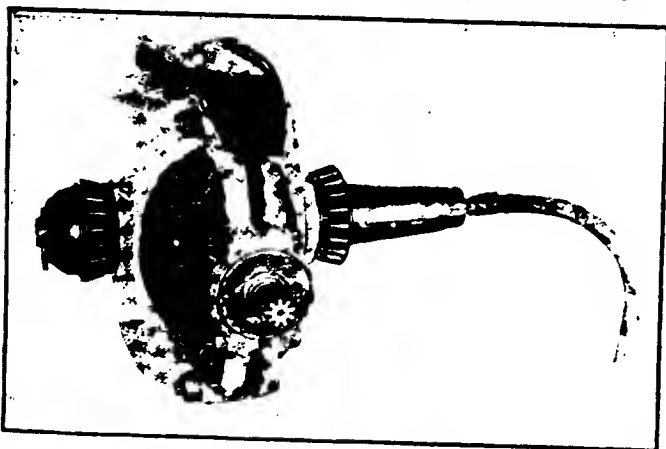
Of the entire construction what is probably the most interesting mechanically is the "evener." The armature of the motor is assembled on a hollow steel tube or sleeve, and into this sleeve the armature shaft is fitted. This consists of two

sections, each having a pinion cut integral at one end, and at the other a flanged collar. Into each of the flanges are cut two diametrically opposed U form notches. Two short steel bars with enlarged central sections, through which are bored holes, fit into the notches in the collars. A housing slides over the coupling and is bolted to a flange on the sleeve, and a steel pin extends through the housing and the bores of the short steel bars, which is secured by cotter pins at either end. The evener affords what is known in mechanics as "couple action," and from this the name "Couple-Gear" is obtained. The gear reduction in the wheel is 25 to one, and more than 97 per cent. transmission efficiency is claimed for the wheel at the full load of the motor. The "evener" affords ample elasticity when starting and is extremely simple and comparatively cheap. As each wheel is driven independently there is no need of any form of differential gearset.

In the construction of the chassis the Couple-Gear bridge type or trussed axle is used, this having great strength and minimum weight, for the rear set of wheels, but the front axle is a steel drop forged I section with the conventional form of steering knuckles, the front wheels being a steel disc construction that revolve on large Timken roller bearings on the spindles.

Chassis Frame Construction.

The chassis frame is constructed of steel channel section, having curved front and rear members that are filled with oak and which serve as shock absorbing bumpers. The construction is such that the frame may yield slightly behind the filling of the cross members. The frame is strongly re-



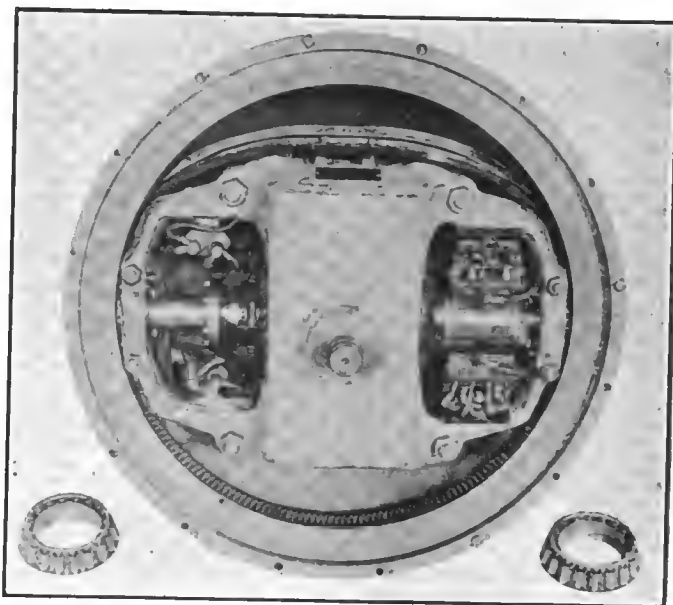
The New Type Four-Pole Five Horsepower Motor Designed for Heavy Duty Truck Service, Showing Roller Bearings of Wheel Mounting.

inforced and gusseted and braced by diagonal rods so that it has unusual flexibility. All the frame members are hot riveted and the purpose is to have exceptional endurance and to insure against crystallization in exceptional working conditions. The frame is suspended on semi-elliptic springs that have unusual resiliency. The rear springs are outside the frame to obtain low center of gravity. The front springs are 50 inches long and three inches wide, and the rear springs 58 inches long and 3½ inches wide. Between the spring eye centres is carried 56 per cent. of the frame length, this being an unusual degree of support, and, of course, this applies to the load when equally distributed.

The wheelbase is 142 inches and the tread 68, and the length over all is 212 inches. The loading space, without overhanging the chassis frame, is 164 inches. The steering gear is an irreversible worm and split nut construction with a 22-inch hand wheel. The controller is a street railway type specially built by the Couple-Gear Co. for this service, having large contact blocks and fingers to insure against fusing where the draft of current is exceptionally large.

Stone Interchangeable Battery Box.

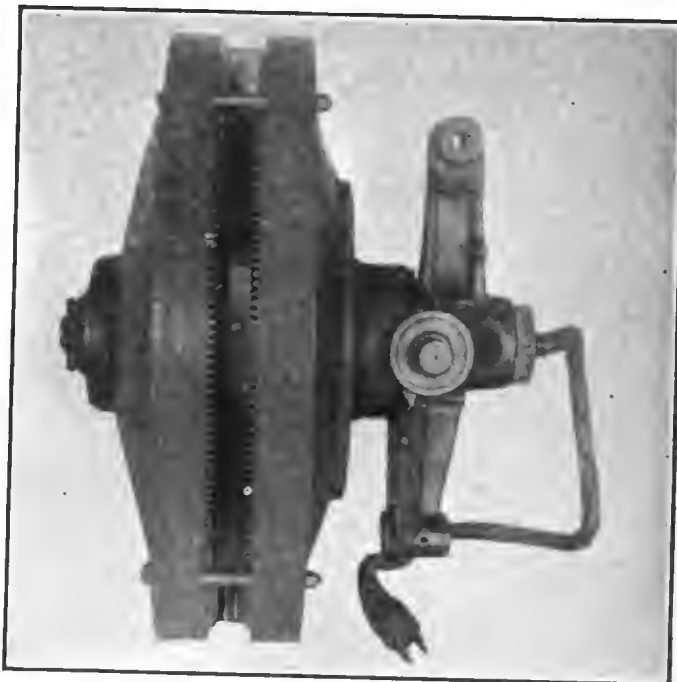
The chassis is equipped with the Stone Interchangeable battery compartment, a construction that is patented, which is designed to truss the chassis and insure against frame sag or breakage. This consists primarily of two vertical members riveted to the frame that are braced forward or rear by a single diagonal, and these vertical members support two heavy transverse channels extending across the frame. These



Outer Wheel Disc Removed to Show the Mounting and the Proportions of the New Motor and the Roller Bearings on Which the Wheel Revolves.

transverse channels support the bottom of the battery compartment, which is a platform having longitudinal members, the ends of which are formed to engage with the flanges of the channels. The description "dowel construction" is applied in the patent covering the design of the compartment, and this is meant to imply that when the bottom or tray is seated the ends of the longitudinal members engaged with the transverse members, the entire structure is a truss and maintains the exact relation of the frame.

The battery compartment is between the springs, and the section of the frame that might ordinarily be subjected to stresses is trussed and braced so that there can be no sag or deflection between the spring hangers. The battery itself is a lead-acid type that is carried in a series of trays placed in rows transversely on the floor of the compartment. This battery can be removed on the removable floor of the compartment with an elevating jack, and any crate or the entire battery can be very rapidly taken out. Claim is made that with a jack two men can make complete change of the battery in four minutes, which is not exceptionally fast work.



Wheel with Rim and Tire Removed to Show the Pinions of the Armature Shaft Seen from the Top—The Assembly Is Mounted on the Axle Spindle.

Log Hauling With Trucks Large Economy

Irrigation systems projected and developed by the government in western sections of the country have frequently established the value from an economic viewpoint of new adaptations of methods or uses of equipment. One of the results of building a system in West Washington, of which Lake Ketchees is now the storage reservoir, was the utilizing of trucks for hauling timber that has converted many lumber men to the economies of machines as compared with animal haulage. This was through trying trucks with trailers for work on heavy timber land where absence of roads and extremely hot weather caused the loss of numerous horses.

The lake is in the Cascade mountains, about $3\frac{1}{2}$ miles from Easton, a small town on the Northern Pacific railroad, and the basin was chosen for the reservoir. The engineers planned a dam 40 feet high at the outlet of the basin and to accumulate water to the height of the dam. The area to be submerged was heavily wooded and cutting the timber and floating the logs to the outlet was a very practical way of conserving valuable lumber, which would be lost if not cut, and at the same time clearing the lake to insure against obstruction of flowage that might result.

The Cascade Lumber Co., Yakima, Wash., bought and cut the timber as the dam was building, and as the water accumulated the logs were floated to the outlet, whence they were to be hauled to the railroad. Horse teams and timber reaches were first used to haul the logs. The path to the railroad was soft and the ground often yielded under the wheels whenever a team stopped with a

loaded reach to such an extent that "snatch teams" were needed at short intervals to start the stalled teams. This very largely increased the cost and the company sought what would reduce expense.

The White Truck Logging Co. of Tacoma undertook the work with two three-ton White trucks with trailers. These were loaded with from 3000 to 5200 feet of logs, the former being the average and for two seasons the daily haulage averaged 60,000 feet, against a maximum of 40,000 with horses. The hauls were hard, in places the grades being as high as 10 per cent. Semi-trailers with reaches adjustable to the length of the logs were found to be the most satisfactory, most of the logs being 42 feet long.

The logs were loaded with a gasoline engine that hauled them from the water and lifted on to the truck with a gin pole tackle, and at the railroad siding they were unloaded and placed on cars with a derrick operated by a steam donkey engine. The saving of time and money with the trucks was a very large item in the statement of the lumber company, and the truck operator made a substantial profit from their use. The possibilities with trucks in lumbering operations demonstrated in this work has led other concerns to buy and utilize them, with, assumedly, at least reasonable revenue from their use.

MINER WITH DUPLEX TRUCK.

The Duplex Truck Co., Lansing, Mich., has made Fred J. Miner its representative for the southeastern states. He was associated with the Duplex Power Car Co. when the company was located at Charlotte, Mich., and is a pioneer in the automobile and truck industries, having been connected with the Olds Motor Works of Lansing and the Cadillac Motor Car Co. of Detroit.

QUICK HEAVY TRUCK TRIP.

What is probably a record for heavy truck driving was made by two blue jackets from the Great Lakes naval train station when they drove from Winthrop Harbor, Ill., to Washington in 96 hours, making 950 miles, covering all kinds of roads at much better time than is ordinarily made by touring cars.

The trucks were Winther three-ton units, shod with Giant pneumatic tires, and were delivered by the Winther Motor Truck Co. to Lieut. Merrill, to be delivered to the United States navy, which will use them for regular service carrying explosives between fixed points in several of the eastern states, the distances being approximately 200 miles.

The trucks left Winthrop Harbor at 4 o'clock the afternoon of April 25 and April 29 at 4 o'clock they arrived at Washington, averaging 237½ miles a day, considering elapsed time, or slightly less than 10 miles an hour. But the actual driving time was considerably less and the speed was much faster than is indicated by the average mileage. Incidentally the trucks were delivered in prime condition.

HERZ & CO. EXPANSION.

The Pro-Mo-Tor Fabrication Corporation has been organized under New York laws to exploit Herz spark plugs and other specialties produced by Herz & Co., New York City. The president is Russel A. Cowles, president of the Ansonia Clock Co., the Metals Trading Corporation, and vice president of the Ansonia Brass Co., who is also identified with other important enterprises. Gustave L. Herz is vice president and general manager, Edward S. Rothchild, president of the National Bank of New York, is treasurer, and Mark Eisner is secretary and counsel. These men, with Benjamin Liesberger, well known in the metal trade, are the directors.

The purpose of the company is to inaugurate an intensive advertising selling campaign, the plant has been considerably enlarged and new equipment has been obtained. Statement is made that the demand for Herz plugs has exceeded the supply, for the business has been very conservatively conducted. The production is now to be greatly increased and the quality maintained.

EXPOSITION POSTPONED.

The annual exhibition of the Eastern States Agricultural and Industrial Exposition, Inc., at Springfield, Mass., has been deferred for this year because the United States government has taken over the ground, which will be used for a storage depot until March 1, 1919. A tentative date for the 1919 exposition has been named—the third week in September.

The offices of the Minerva Engine Co. have been removed to the Vickers building, East 66th street and Euclid avenue, that city.



Three-Ton Truck and Trailer Used by White Truck Logging Co., Tacoma, Wash., Hauling Timber from Irrigation Reservoir Site Through Forest Paths.

CLEVER TRUCK PUBLICITY.

A booklet entitled "Puzzledmuch Meets Sellemfast" has been issued by the International Motor Co., builder of Mack trucks, which is decidedly clever in that with a series of cartoons many of the talking points of its products are illustrated. The ideas, arguments and drawings were originated by H. C. Bailey of the International-Mack Corporation, St. Louis, Mo. "Sellemfast" is a Mack truck salesman who expounds to "Puzzledmuch" the various features of Mack design, pointing these out without invidious comparisons in an extremely convincing manner. The booklet can be obtained by writing the company at its New York City address, West End avenue and 64th street.

FRUEHAUF TRAILER AGENT.

Gerlinger & Co., San Francisco, Cal., has been made factory representative of the Fruehauf Trailer Co., Detroit, and will distribute trailer units in the states of Washington, Oregon, Idaho, Utah, Nevada, California and Arizona. E. E. Gerlinger, president of the company, well known in the industry and trade, obtained the Fruehauf agency because of the completeness of the series of Fruehauf semi-trailer units and the fact that the company is one of the oldest and is widely and favorably known.

LANE SALES REPRESENTATIVES.

Appointment of sales representatives is announced by the Lane Motor Truck Co., Kalamazoo, Mich., which includes that of B. H. Vail, with headquarters in Indianapolis, Ind., and at the factory, for Indiana, Ohio and lower Michigan; O. H. Pearsall for northern Michigan and Wisconsin; L. H. Cossey for western New York and Pennsylvania; E. P. Lane for Minnesota and the Dakotas, and Ralph B. Comins for New England.

The Pittsburgh service station for Westinghouse automotive electric equipment has been moved to 6905 Susquehanna street, in the Homewood district, and express and freight shipments should be made to East Liberty, Pa., by Pennsylvania railroad.

Republic Is World's Largest Truck Builder

Claim is made that the Republic Motor Truck Co., Alma, Mich., is the largest builder of motor trucks in the world, and that upwards of 30,000 Republic machines of all sizes are now in use in different parts of the world. Obviously the greater part of these are in the United States, but a considerable number are in foreign countries, the exportations to South Africa and Australia for several years having been comparatively large.

The company's plant at Alma is the largest industry of the city and the executives maintain that the rapid growth of the plant has been the main cause of the relatively quick increase in the population, for the thousands of employees must be housed and homes must be provided for them if permanent residence is expected.

The plant of the company covers more than 25 acres of land and practically since the concern was established building has been constant, for the demand for trucks has been in excess of the production facilities and expansion of the various departments has been necessary. As a matter of fact, at no time has the works had excess space available, although each addition was expected to be sufficient to provide for anticipated increase. The buildings are generally reinforced concrete and steel and these have been equipped with every practical means of conserving time and labor, while the workmen have all conveniences that are desirable for their health or welfare. Much attention has been given to lighting, ventilation and heating, and from a production point of view the plant is ideally planned. All of the buildings have been erected within four years, and in no respect are these comparable with converted plants that have been used for years and were not originally constructed to ideals.

The works are not like some others. The company has a large foundry in which castings are made. The engine

shop produces units in great numbers to the exclusive Republic design. The radiator shop builds radiators designed especially for Republic trucks, and in addition to this are machine and assembling shops when the machines are built and made ready for the tests. Besides its own plant the company controls the Torbensen Axle Co., Cleveland, which produces axles that are used in large numbers in Republic units, this being a separate concern that has a works of considerable proportions.

Torbensen axles are probably better known as being the product of the pioneer internal gear drive manufacturer, and these units have been used since 1901, so they are well established as mechanically sound and splendidly constructed. Claim is made for the efficiency of these axles that is based on long service and abundantly justified by experience.

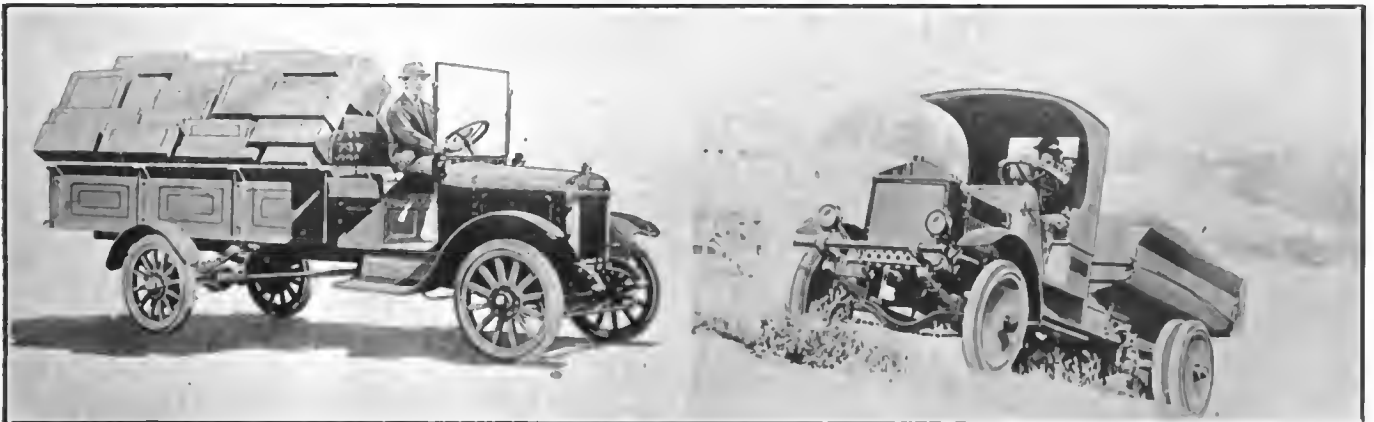
The company produces truck chassis that have load ratings from 1500 to 10,000 pounds in seven different models, these being adapted for all freighting purposes, and they are equipped with standard type hodies to meet general requirements. The sales organization, which has been developed by President Frank W. Ruggles, is represented in all parts of the country, and statement is made that Republic trucks are in use in more than 1300 commercial centres in America.

NEW MENOMINEE FACTORY.

The plant recently erected, which includes machine and blacksmith shops, body, painting and trimming departments, and a large assembly room, is now occupied by the Menominee Motor Truck Co., Menominee, Mich. The company expects that it will produce 1000 trucks this year, or double that of 1917.

NEW N. A. C. C. TRUCK MEMBERS.

The Sanford Motor Truck Co., Syracuse, N. Y.; United Motors Co., Grand Rapids, Mich., and the Ward Motor Vehicle Co., Mount Vernon, N. Y., have become members of the National Automobile Chamber of Commerce, making the total of this class of membership of the organization 55.



Two of the Types Built by the Republic Motor Truck Co., That at the Left Designed for Fast Work with Moderate Loads, and That at Right for Heavy Duty and Slower Speed.

Five-Ton Packard Makes Drive Record

A record for driving a five-ton truck long distance was recently made with a five-ton Packard machine that had been added to the fleet that is operated by the Goodyear Tire and Rubber Co., between Akron, O., and Boston, this service being generally known as the Goodyear Akron-Boston express.

The service was established as the result of an emergency trip that was made in April, 1917, from the factory to the Boston branch with a load of tires, and it was so much of a saving of time and the uncertainty of both freight and express shipments was so great that it was continued.

The trucks are manned with two drivers and are not stopped en route, save for meals and replenishments of fuel, oil and water, for meals or such adjustments as may be necessary. The route is from Akron southeast to Pittsburgh and thence along the Lincoln Highway to Philadelphia and New York, and over the Boston Post Road to Boston. Returning the route detours from the Boston Post Road to the Goodyear fabric mill at Killingly, Conn., and then reaching this highway near Hartford retraces it and the Lincoln Highway to Akron.

The mileage for the round trip is given by the Goodyear company as 1560, the return being somewhat longer than the first half because of the detour specified. The time for the trips ranges from six to nine days, according to the season and the weather, this being variable in either direction. Generally speaking three and a half days is as fast as a half trip can be made, though this is not scheduled. As the trucks are shod with Goodyear cord pneumatic tires they can be driven much faster than machines equipped with solid tires, and 30, 28 and 25 miles an hour are the maximum speeds allowed for the 1½-ton, 3½-ton and the five-ton trucks, machines of these rating being utilized.

As road conditions may necessitate extremely careful driving, a schedule can-

not be maintained, but the drivers endeavor to make as fast time as is justified. The Packard truck was loaded to full capacity with special products needed for Massachusetts shoe factories and made the run through in 77 hours elapsed time and 49 hours and five minutes actual time, which was at the rate of 15.08 miles an hour. The truck left Akron at 7 o'clock the morning of Feb. 21 and reached Boston at 12 noon Feb. 24. The details of the trip from point to point, showing distance, actual driving time in hours and minutes and the gasoline consumption is as follows:

From	Miles	Driving Hrs.	Time Min.	Gas. Gals.
Akron to Beaver Falls, Pa.	85	5	30	17
Beaver Falls to Pittsburgh	30	1	30	..
Pittsburgh to Greensburg	30	2	..	16
Greensburg to Ligonier	18	1	15	..
Ligonier to Bedford	50	4	..	23
Bedford to Chambersburg	54	4	45	17
Chambersburg to Gettysburg	30	1	35	..
Gettysburg to Lancaster	56	2	55	15
Lancaster to Philadelphia	48	3	35	13½
Philadelphia to Trenton	39	1	30	..
Trenton to New York	64	3	40	15
New York to Bridgeport	56	4	10	10
Bridgeport to Springfield	83	4	35	12
Springfield to Worcester	57	3	20	10
Worcester to Boston	40	4	45	6½
Total	740	49	05	155

The total oil consumption was 17 quarts.

The average miles an hour of actual driving time, 15.08.

Average miles an hour of gasoline used, 4.8.

Average miles a quart of oil, 43.5.

This truck is equipped with 44 by 10-inch pneumatic tires, which is the reason that the driving time averaged so high. It is, in fact, the fastest time ever made by a truck of five tons rating, fully freighted, for so great a distance, and considerably exceeded the speed of any of the other five trucks in the service. One will note that of the total elapsed time of 77 hours, 27 hours and 55 minutes were taken by stops. The actual time averaged for the distance covered was 9.61 miles an hour.

The capital of the Gary Motor Truck Co., Gary, Ind., has been increased \$50,000 to \$175,000.

"HISTORY'S LESSON TO THE MOTOR TRUCK."

"History's Lesson to the Motor Truck" is the title of a handsomely printed booklet published by P. W. Litchfield, vice president and factory manager for the Goodyear Tire and Rubber Co., Akron, O., which deals with the development of different forms of transportation that have been commonly utilized by civilized peoples, and which leads up to the use of power trucks and pneumatic tires, which is pointed out as the essential equipment that will afford the most economical transport by highway.

Emphasis is made of the need of the power truck to minimize haulage cost, of the seemingly almost unlimited possibilities with these machines, and that with cord pneumatic tires economies can be realized in largest measure. The booklet is decidedly interesting reading and is worthy the attention of all who are in any way interested in highway vehicle use. It will be sent at request to those addressing the company.

NEW COLUMBIA AGENCIES.

The Columbia Truck and Trailer Co., Pontiac, Mich., has made agency contracts with the following: Auto Engine and Supply Co., East Madison, Ia.; Bell Motor Co., Joplin, Mo.; H. H. Collins, Rockford, Ill.; Columbia Truck Co., Louisville, Ky.; F. X. V. Dolder, Ottawa, Ill.; John L. Judd, Boston, Mass.; Lawrence Motor Sales Corporation, New York, N. Y.; Phillip Lichtenberg, Detroit, Mich.; Motor Sales Co., Pontiac, Mich.; Maurer Bros., Freeport, Ill.; Meade McClatchey, Canton, Ill.; North Iowa Motor Co., Mason City, Ia.; E. T. Radcliffe, Galesburg, Ill.; W. G. Stone, Hillsdale, Mich.; Standard Motor Co., Baltimore, Md.; F. Sippel Auto Co., Joliet, Ill.; Studebaker-Wilson Co., Missouri Valley, Ia.

The Tower Motor Truck Co., Greenville, Mich., has obtained additional resources by increasing its capital from \$100,000 to \$200,000.

A fire has damaged the buildings of the Giant Tire and Rubber Co., Findlay, O., recently to the extent of \$140,000.



Packard Truck That Made Record for Akron-Boston Express Service: At Left, Front of Machine Showing Drivers' Compartment; at Right, Storage Box and Spare Tire at Rear End.

TRUCKS AT HOG ISLAND SHIPYARD

*Over 300 Passenger and Freight Machines,
Working at Mammoth Plant, Wonderfully
Economize Time and Labor*



The First of the Hog Island Shipyard Acason Truck Fleet Leaving the Detroit Factory for the Drive to Philadelphia.

HOG ISLAND may be regarded as synonymous with "Somewhere in France" so far as the American people is concerned, and it is about as definite in the minds of average citizens, the only real knowledge possessed being that at Hog Island the government is constructing a mammoth ship yard, and in France the Allies are waging war against the menace of Germany dominating the world. Some know that the American-International Shipbuilding Co. is doing the work under the authority and supervision of the Emergency Fleet Corporation, and there is vague understanding that when the yard is completed large numbers of vessels will be built there, the facilities being such that these can be constructed with extreme rapidity.

Practically every day the attention of the people is directed toward Hog Island by statements published in the newspapers, many of these having to do with what are regarded as records for different works. Others deal with the needs of the yard as an undertaking with reference to labor, and the public is informed that varying stages of completion have been reached. Occasionally articles have been published which outline the magnitude of the work, and these present totals that are quite beyond the grasp of the average mentality, for figures cannot accurately reflect proportions that might be visualized or comprehended were one to visit the yard.

Greater works have been undertaken by the American people, and among these may be included the Panama Canal, the New York City water works system, the New York City subway system and numerous large railroads, but all of these have been carried on in normal conditions, when time was not the main factor and no serious consequences would result from delay.

Time a Very Important Factor.

But at Hog Island time is vitally important. Here is building the largest ship yard of the world, one of the four great plants in which the government is to produce vessels in such sizes and numbers that there will be adequate tonnage for transporting troops and supplies to Europe despite the losses from the submarine warfare of the Germans. Since the beginning of the war there has been constant shrinkage of vessels and with expectation of further loss there was every reason why the yard at Hog Island should be actively constructing craft at the earliest moment possible.

Why Hog Island was selected as a site for a main ship yard is not a subject for discussion. There are those who maintain that the natural conditions were such that much costly work was necessary before actual construction could be

begun, and that this very greatly retarded production. There can be no question that the yard is located in what was until last autumn a marsh and very low land, covered in part by tide water, much filling being required to elevate the yard surface in places to such a level that it cannot be flooded in the event of freshet or exceptionally high tide.

Island Not Easily Accessible.

Hog Island is contiguous to Philadelphia, and it can be reached by ferries, by trolley cars and by extensions of the Reading railroad. The property extends along the Delaware river, and there is sufficient water to launch and float the largest ships that will be built. But until the site was decided on Hog Island was one of the most unattractive places and there was no special reason for visiting it. So not until then were means of communication established. The ferry from Philadelphia reaches the river front, the trolley line is within a half mile of the yard and the railroad branches enter it. Aside from the trains the only transportation is by animal or power vehicle. The yard itself is a very large area, enclosed by a high fence that is guarded. The acreage of the yard is not important.

When the property was acquired and the construction plan determined the first work necessary was to extend railroad trackage with which to haul material, establish a ferry and erect a fence. After this the erection of various buildings was imperative, and as quickly as was possible the building of ways was begun. This sounds very simple, but the transformation of a marsh into the yard means innumerable works and the employment of many thousands of skilled mechanics and laborers. That the work could be carried on thousands of tons of material were needed, all of which had to be hauled and handled.

Construction Has Been Permanent.

While the plan was for emergency work the intention was that the con-



The Acason Chassis Equipped with Armored Body Used by the Police Department at Hog Island for Transporting Men and Prisoners.



Five-Ton Acnson Truck with Train of Three Troy Trailers, Used as a Tractor for Haulage of Heavy Construction Materials.

struction should be permanent, and the installation of a sewerage system, water mains and ample protection against fire, roads and walks and power plants were included. The layout of the yard called for the erection of a series of 50 "ways" along the river front. These are in reality wide alleys paralleling each other, the sides of which are great scaffolds that tower into the air, in the centers of which are the "ways" or tracks on which the keels of the vessels are laid and which extend far into the deep water of the river. The alleys are such length that craft of 450 feet or longer can be built on them and are at such angle that when completed that vessels will by gravity slide into the water.

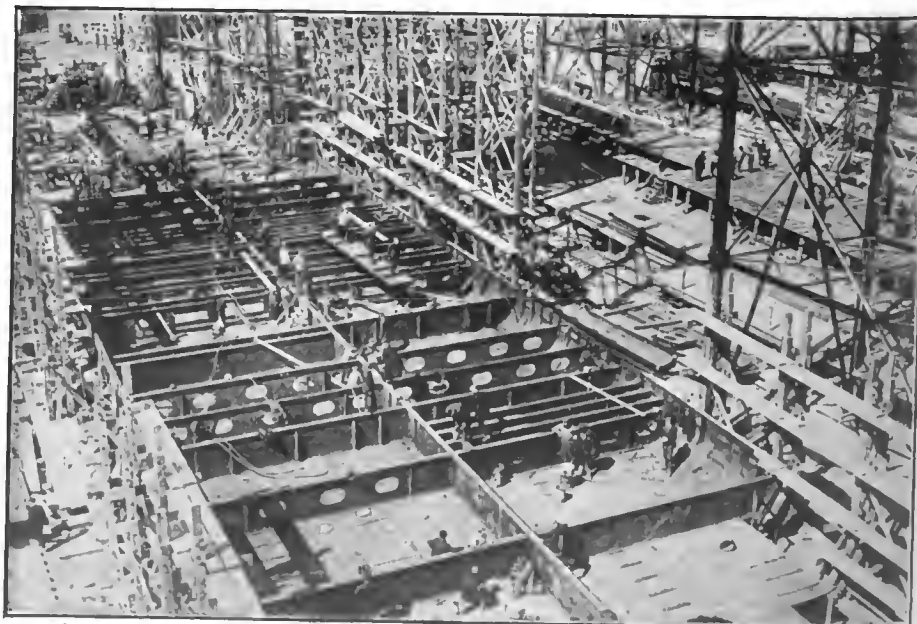
Because of the enormous weights upon the "ways" foundations of piling were necessary under all of them. The scaffolds were required that the workers could reach the sides and superstructures of the vessels as they were built from the keels upward. Numerous derricks were equally necessary for handling the great wooden and steel parts that were to be placed and secured in each hull. Every construction was planned with a view of conserving time and labor. Haste was all important. This could only be accomplished by beginning each work as early as was practicable and working large gangs of men, not for a part of each day, but to continue unceasingly by having two or more shifts of men. The work on the yard was begun in the autumn.

The railroad brought the material in large part into the yard. Much of this, the piling, timber and lumber, was stacked. Warehouses were built to store metal and tools. By rail and vessel equipment was taken to the yard. Dredges were set at work to make channels to wharves and to the ways. Big steam shovels were used for excavating. Industrial railroads were laid down for handling some material. The roads that at first were paths worn by driving carts and trucks wherever convenient, were better defined as the buildings and other structures were erected, and later on in these the water mains and sewerage pipes were laid. One of the first constructions was a fire alarm system and another was an emergency hospital, and equally necessary were guard houses, a calaboose, stables, garages, office buildings and other structures.

As the plans were followed and the

works progressed additional workers were employed, so that now approximately 40,000 men are in the yard, to say nothing of those who have to go to it in connection with delivery of material, and practically every mechanical trade is represented among them. When the construction is completed these men will be replaced by men who will build the ships. There is probability that a very large part of those now at work will turn to vessel assembly, for the purpose is to produce fabricated craft, which will be to standard designs and which will be turned out with extreme rapidity. There is expectation that each of the 50 "ways" will be utilized at once, and when the yard is working at top speed, with day and night gangs, there is reason to believe that the launchings will be at least one daily, and perhaps two on some occasions.

But up to the present time practically all work has been construction of the yard, and while no statement has been made there is reason to believe that this has been well advanced—at least to such an extent that keel laying will be begun in a short time. One will understand that to the visitor to the yard there is at all times apparently great confusion, though the work is splendidly organized.



In One of the "Ways" of the Hog Island Shipyard, Where Workmen Are Constructing the Bottom of a Large Vessel. This Being the Initial Work After Laying a Keel.

Each division or department is systematized with extreme care and every care is taken to insure the greatest degree of productivity. Every equipment has been chosen with reference to efficiency and utility, expense being secondary.

Time Economy by Power Vehicles.

This policy has resulted in the use of power passenger cars, trucks, tractors and trailers wherever possible, and while many animals are utilized with wagons and carts, especially where the hauls are short and infrequent, or where there are obstructions to travel, the greater part of the haulage is done by power. There are instances where a team of horses can be used for hoisting or for capstan work, or where the ground is soft, and occasionally for "blitch work," but where derricks are erected steam hoilers and engine hoists are the rule. Taken as a whole the horse equipment may appear large, but one can understand that the animals can be worked not more than 10 hours a day, while the power trucks can be kept in service continuously so long as the drivers are changed.

The work done to a very large extent with power trucks, tractors and trailers includes building 15 miles of roads and walks, laying approximately 13 miles of sewerage mains, laying water mains, hauling the timber and lumber and different classes of material, such as gravel, sand, cement and structural steel and iron and nails, spikes, roofing, steam and plumbing supplies. Some of the roads have not as yet been completed, and there will be additional sewers constructed and water mains laid. So long as the yard shall be operated, however, there will be increasing haulage of ship steel, timber and other stock and cement, for the yard will have 40 ways for building wooden or steel vessels and 10 ways for constructing cement hulls.

Must Haul Vessel Material.

The cement vessels will be skeletons of steel rods covered with cement to va-

rying thicknesses, which will be poured into forms and hardened by exposure to the air. Handling the sand, gravel and crushed stone and cement from which these will be built will be a large undertaking. The materials will be brought to the ways, mixed and then hoisted and poured into the forms. The cement may be brought in by vessel or railroad, stored to protect it from dampness, and for this reason must ordinarily be warehoused, but the other materials will be obtained from pits and banks and quarries that are convenient.

The steel and timber and piling may

and between the trolley terminal and the yard the company operates six truck chassis equipped with bodies that will seat 40 persons each, for the workmen, and six truck chassis having bodies that will seat 20 passengers each, these being used by the officials and heads of departments, superintendents, etc. In addition to these the company has seven converted chassis that are used for transporting the workmen, making 19 vehicles in all in this service. The passenger 'buses are used practically all the time and during a day thousands are carried from

police department works in conjunction with the hospital and has charge of the seven ambulances that are constantly on duty. One of these is a regular army service ambulance body on an Acason chassis, and the others are small bodies on Ford chassis. There is also a police or guard patrol wagon, which is a large body on an Acason chassis. The department also supervises the payment of the workers, which is done from an armored body on an Acason chassis. This machine goes from one part of the yard to another, so that the workmen shall lose no time and be inconvenienced in receiving their pay.

The fire department is well equipped from every point of view. This has three stations in the yard, in each of which apparatus is ready to respond to alarm. This is directed by a chief and an assistant chief, and it has available two LaFrance 750-gallon fire pumps and hose carriers, five Brockway combination hose and chemical wagons, a city service ladder truck, a chemical wagon, four hose tenders and two cars for the heads of the department, a total of 15 in all. The fire department is highly organized and it is composed of picked men, for the danger from fire is keenly realized and every care is taken to safeguard the property.

From 175 to 200 Trucks at Work.

The heavy haulage work at the yard is



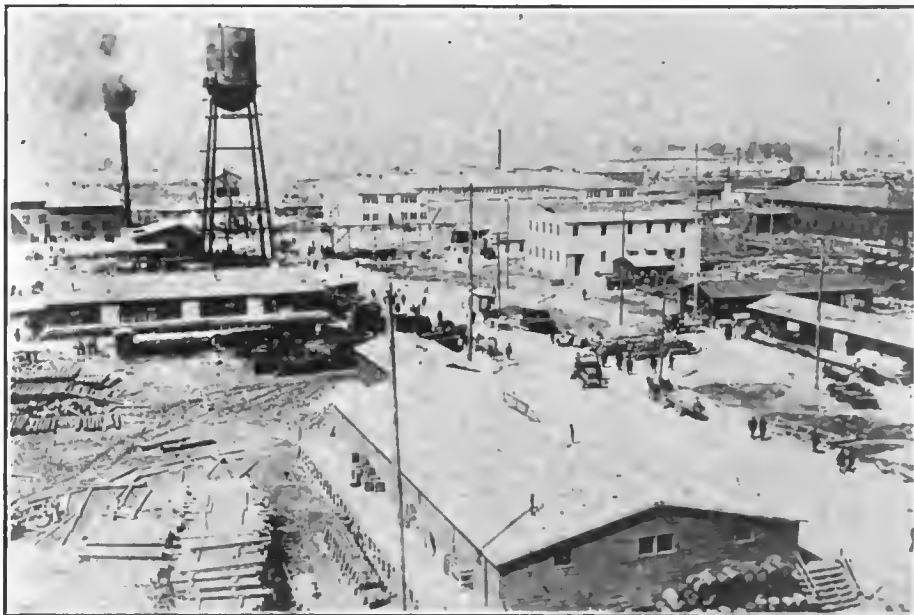
A General View Showing the Vast Proportions of the Hog Island Shipyard, with One of the Numerous Storehouses in the Foreground.

either be brought to the yard by vessel or railroad and must be necessarily stacked where it will be easily accessible. But from all the stores of material the needs for each work will be requisitioned and hauled to the way or to the locality where they will be used. But, of course, there will be innumerable works in which power vehicles will be used in addition to those stated.

More Than 300 Vehicles Used.

In the yard today is in service more than 300 power vehicles, both passenger cars and trucks, and there is reason to assume that this equipment will be considerably increased. The American-International Shipbuilding Co. owns 50 touring cars that are used for general service and it hires upwards of 60 more. The executive offices of the company are at Cherry and Broad streets, Philadelphia, and between these and the offices of the many departments of the yard, and different concerns elsewhere, officials and messengers are constantly in transit. The time of these men is valuable and for that reason cars are used by them. Some of these cars are used almost exclusively in the yard and others make trips to and from the executive offices.

Comparatively few of the men employed in the yard live close to it. The majority have homes or board in Philadelphia and its suburbs and in Camden, across the river. For this reason trains are operated at frequent intervals on the Reading branch that enter the yard. The ferry line is also direct to the yard, but the nearest trolley line is at 94th street,



A Group of Warehouses and Office Buildings in the Hog Island Shipyard, with Stores of Materials, Accumulating Preparatory to Vessel Construction.

the cars to the yard and from the yard to the cars.

Fire and Police Motor Equipment.

The yard is better organized than the average municipality with reference to police and fire protection. There is a regular guard, and in addition a secret service, both of which are independent of each other. There are 600 men in this department alone and every approach and every exit is carefully guarded. Not only this, every worker must have means of identification and the fullest inquiry into the business of every visitor is authorized and expected. The

done with four Lombard tractors, 32 Acason five-ton trucks, 33 Autocars and somewhat more than 100 trucks of all sizes that are hired and worked constantly. Sometimes the number of hired trucks is considerably increased. Generally speaking the total number of tractors and trucks will range from 175 to 200. Of course the work done is greatly diversified. Some of the machines are small, that is, having load capacity of 1½ or two tons, and the range is upward to five tons. The greater number is equipped with platform bodies, because these will serve the most useful

purposes and all kinds of stacked loads can be carried, but others are equipped with Lee unloaders, Mead-Marsh hoists and other types of quick discharging bodies. Of the company-owned trucks 32 are Acason five-ton machines, and many of these are used with trains of five-ton Troy trailers, usually hauling three units. The other company trucks are Autocars, which are adapted for lighter work, several of these being fitted with equipment for doing plumbing, steam fitting, electric and other work where heavy tools are required, and these can be taken quickly wherever desired and without loss of time of the men.

The Lombard tractors are a type that was originally designed for logging in the Maine woods and have large power. These are utilized for hauling large objects, such as pile driving towers and other construction that cannot be regarded as portable and which could not be otherwise handled unless disassembled and again assembled. Where the ground is soft and the trucks cannot be worked the tractors will haul large loads with surprising ease.

Working Conditions Very Difficult.

That all of the work has been or is be-

During the entire winter the haulage work increased. There was but one possibility, and that was to add more units and to carry as heavy loads as was practical considering the conditions. This policy, with overtime work, kept pace with the workers, for where construction could only be done by daylight the trucks hauled material during the night so that the gangs would have whatever was necessary without cause for retardation. The work throughout the winter was carried on with but one object in view—gaining time wherever this could be done, and, of course, additional trucks was the only solution.

Speed Due to Power Vehicle Use.

There is no question that a very large degree of the progress made with the work on the yard is due to the character of equipment used, and there is equal reason to believe that had not trucks, trailers, tractors and cars been available nothing like the results obtained would have been possible. There is nothing remarkable in the policy of the company in using the best facilities obtainable, for that would be the recommendation of any sound engineer. The company had confidence in truck equipment and used

to keep them idle. The organization is very complete and the work is well done. While the company works the trucks hard there is no disposition to sacrifice valuable property, and too much depends upon the serviceability of the machines to neglect them. Appearance is a matter of no consequence, but mechanical condition cannot be too high.

NEW TAVRIA-A LITERATURE.

A handsomely designed, printed and illustrated booklet, descriptive of the qualities of Tavia A, one of the road construction products of the Barrett Co., has been produced by the Erickson Co., New York City, advertising counsel. A series of interesting facts are convincingly presented and pictorially some examples of Tavia construction are clearly shown. It also directs attention to other booklets dealing with Tavia and the methods for applying it in road work.

DRIVING TRUCKS OVERLAND.

Shortage of freight cars has caused many manufacturers of trucks to reject contracts for machines for which exact delivery dates were specified. In fact, some have refused to make deliveries other than at the factory, unless in the case of shipments for extremely long distances. Driving trucks overland for hundreds of miles has become quite an ordinary event with dealers remote from the factories, and though the expense is considerably increased, there is no alternative if the trucks can be sold and the buyers are willing to meet the added expense to obtain delivery.

Dealers who handled comparatively few trucks, however, may drive one or two trucks from time to time, but those who dispose of considerable numbers may take delivery of fleets of good size. One driveway of large proportions was that of 42 International trucks from the factory at Akron to Chicago, which was made in April. This fleet, which is shown in the accompanying illustration, included 42 trucks, which had been bought and could be delivered in no other way. In this particular drive good time was made and the machines were all in good condition at the finish. Much longer drives, some from Akron to Boston, 740 miles, have been made, but the numbers sent out were smaller and less interesting to the observer.

MACK LIBERTY BOND PURCHASE.

Builder of Mack trucks, the International Motor Co., New York City, subscribed for \$500,000 Third Liberty Bonds, of which \$165,000 was for its employees. The company made a very liberal offer by which the employee subscribers pay for bonds at the rate of 10 per cent. a month and has agreed to cancel the last 10 per cent. installment if the employees remain with the company when payment is due. The subscriptions were limited to \$500 and the plan of sale applies to subscriptions from \$50 to the maximum.



Fleet of 42 International Trucks That Was Driven from the Factory at Akron, O., to Chicago to Fill Orders of the Branch for Local Delivery.

ing done with trucks may not be regarded as unusual, but even now the working conditions in the yard are very far from what might be regarded as normal. Last autumn the ground was soft and boggy, or soft and sandy, and haulage could only be done with difficulty, for there were not even paths or tracks. As the work was all over the yard no roads could be permanently developed, save near the wharves or ways, or the warehouses and other structures. Of course the surfaces were badly cut, and later on when rain came the ground was exceedingly muddy at times. As rapidly as possible plank paths were laid where there was reason to expect constant traffic, but of course there was always excess at times that churned the ground at either side whenever it was wet or soft. Hauling heavy loads with carts, trucks and teams cut the ground into a condition that when freezing weather came made it extremely rough, and the haulage, which could not be delayed, was carried on at the cost of large gasoline and oil consumption.

It in extremely hard working conditions. The trucks have been proven by the service thus far to be equal to all demands made upon them as equipment, and quite equal to the claim made for efficiency. Not so much attention has been given to records, because expense has not been the principal factor, but the costs have been exceedingly satisfactory from all points of view.

Incidentally, all of the Acason trucks were driven over the road from Detroit, the trains making the drive in mid-winter when the highways were deeply covered with snow and more or less obstructed. The results were so satisfactory with the first fleet delivered that other orders followed until the total referred to elsewhere had been purchased.

The yard has a large garage in which its trucks and cars are kept and maintained, the work in this being directed by a superintendent, who is responsible for the machines being serviceable, and this is operated day and night continuously, for the need of the machines is acute and there is no reason whatever

'NORTON ENTERS SERVICE.

W. F. Norton, for eight years chief engineer for the Selden Motor Vehicle Co., Rochester, N. Y., resigned that position May 1 to enter the service of the Motor Truck Division, Quartermaster's Corps, United States Army, with expectation of beginning duty in France. He retains the title of consulting engineer for the company.

John R. Coleman has been made assistant general manager of the company in charge of engineering and production, and R. E. Martson, for a number of years service engineer for the Packard Motor Car Co., and later chief designer for the

NEW DEARBORN TRUCK PLANT.

The Dearborn Truck Co., Chicago, Ill., on May 1 occupied a three-story mill constructed manufacturing building, with large yard and private railroad siding, at 2515-25 West 35th street, that city, which cost \$105,000. The property has frontage of 133 feet and is 455 feet deep, having an area of more than 60,000 square feet, which is more than four times that of the old plant in Campbell avenue. A 450 kilowatt generator, elevator and new machinery and a sprinkler system for fire protection has been installed.

The new factory was necessitated by the increased demand for Dearborn chas-

Packard Truckmen Offered \$5000 In Prizes

Awards aggregating \$5000 have been offered by the Packard Motor Car Co. to owners and drivers for superior efficiency in power truck haulage, and these will be made on the basis of certified records of operation of Packard trucks for a period of three months beginning June 1. All owners and drivers of Packard trucks can participate.

Statement is made by R. E. Chamberlain, factory manager of sales for the Packard company, that the first object is to give substantial and active assistance to the Council of National Defense, which recently made appeal to the nation for more extensive and efficient use of power trucks in highway transportation. Another object is to introduce to owners and drivers a national standard truck cost system form, adopted and advocated for general use by the Truck Owners' Conference, Inc., of Chicago.

Entry blanks, standard cost forms and information of the competition are in the hands of Packard agents and branches, where they can be obtained. All Packard owners and drivers are eli-



New Truck Plant of the Dearborn Truck Co., Chicago, With More Than Four Times the Capacity of the Old Factory.

Continental Motors Corporation, has been added to Mr. Coleman's staff as executive engineer.

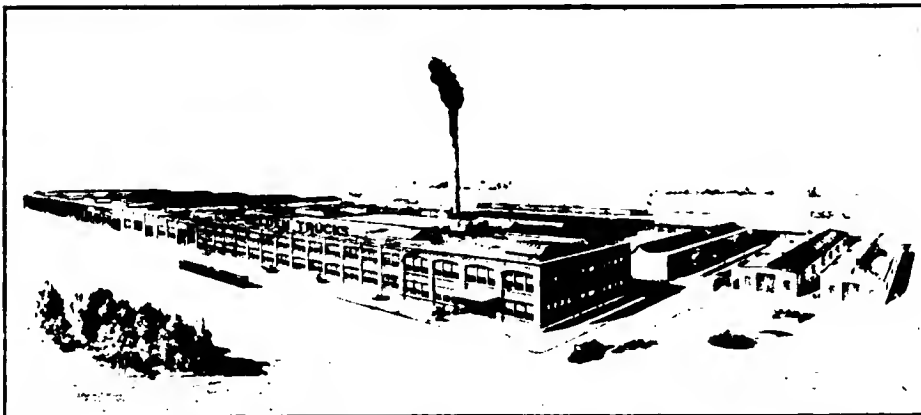
SELDEN FACTORY EXPANSION.

The contract orders for the government and the commercial demand for trucks has so pressed the Selden Motor Vehicle Co., Rochester, N. Y., of late that despite the recent additions to the plant the facilities for production are inadequate. The expectation of considerably greater production prompted the original increases of the plant, which were available early in the winter. Now the company has taken over an additional property, which will be known as the Lyall avenue plant, which will be utilized for assembling trucks to meet government contracts.

NEW BUDA CATALOGUE.

A new catalogue has just been published by the Buda Co., Harvey, Ill., builder of Buda engines for trucks. The publication is filled with engineering information concerning Buda engines that is especially desirable in the library of any engineer, and copies may be obtained by those who will make request written on business stationery.

The Long Manufacturing Co., Detroit, is erecting a building 66 by 125 feet at its plant, which will be ready for occupancy about July 1.



The Factory of the Selden Motor Vehicle Co., Rochester, N. Y., to Which a New Unit Was Recently Added to Assemble Army Trucks.

sis conversion units, which has become general the country over. The office will be located at the plant. Treasurer and General Manager S. D. Porter states that the expansion has been forced, for Dearborn units for Ford and other type chassis have been built with the purpose of affording the owners a large degree of satisfaction. The design was developed carefully and the materials are the best obtainable. Quality and a liberal policy with sales representatives are other important factors in the success of the company. Nothing has been claimed for Dearborn units that has not been proven in actual service.

The plant and offices of the Rowe Motor Manufacturing Co., builder of Rowe trucks, has been removed from East Downingtown, Pa., to Lancaster, in that state.

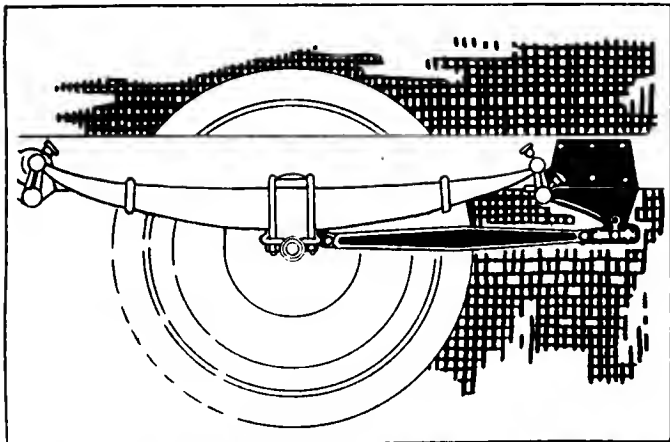
The 1½ and two-ton trucks will be in class A, the three and four-ton trucks in class B, and the five and six-ton trucks in class C, and the classes will not compete.

The award to the winning owner of each class will be \$1000, and the drivers' awards will be \$500, \$100 and \$75 to the first, second and third. The judges will be in no way connected with the Packard company.

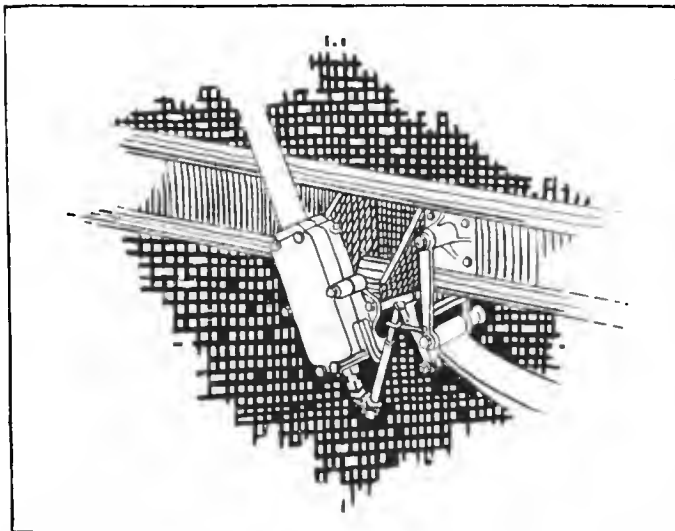
In addition to the main awards stated others will be made to local drivers in a number of cities. For instance, there will be prizes totaling \$600 offered in Detroit, \$500 in Baltimore, several hundred dollars in Columbus, O., and this example will probably be followed in other cities. Statement is made that in Chicago 250 or more entrants are expected, 200 for Detroit, and in corresponding ratio in other communities.

CHARACTERISTICS OF TRUCK DESIGN

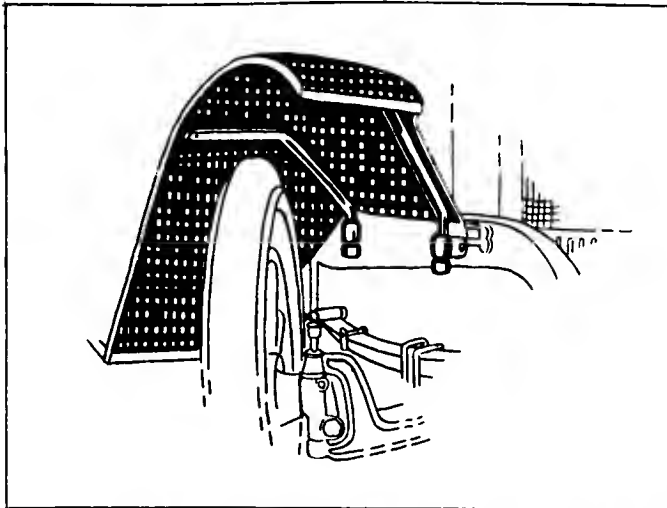
Details of Refinements of Recently Built Light Type Machines



The Nearly Flat Rear Spring, the Spring Hanger and the Radius Rod of the GMC Two-Ton Truck.



The Enclosed Steering Gear of the GMC Two-Ton Truck and Its Mounting in the Chassis Frame.



The Large Single-Piece Front Fender of the GMC Two-Ton Truck and the Adjustable Brackets.

ENGINEERING progression as reflected by the power vehicle industry demonstrates very clearly that there need be no uncertainty in the mind of the man who is seeking equipment, either to replace animal drawn transports or earlier type machines. The main object of the constructing engineer today is to determine the manner of assembly of units that have been produced by specialists and which can be accepted for the face value of the statements made by the manufacturers. Broadly speaking, less than 10 per cent. of truck builders produce the units incorporated into the machines, though a very large number make or have made the smaller parts that are used. As a rule frame steel is bought in quantity and cut and in some instances formed, although gusset plates and some of the cross and rear and front end members are specially formed. Frequently the brackets for the fenders and running boards, the spring hangers, the brake shaft brackets and the smaller components are made to designs by specialists who produce them in quantity to specification.

The science is in assembling the units into a chassis, and after these have been determined a great deal of careful study is often necessary to obtain desired results. The main purpose is to have all parts readily accessible, for this means that all adjustment and repairs can be made with the least possible labor, and there is decidedly practical economy in having such construction that not only will the work be done when it is needed, but through minimized work the idle time of the truck will be correspondingly reduced. No business man purchases a truck for any other reason than to obtain economy. There is no question that trucks users understand that if they do not utilize them to the fullest degree they themselves will be the losers, and while they may not have given thought to animal transportation expense they are keenly aware that an idle truck during working hours means reduced profit or loss.

Well Built Truck Will Endure.

Then from the engineering viewpoint the truck that will endure, that will require the least repairing of a character that will withdraw it from service, and which can be kept in operative condition with systematic attention and adjustment and ordinary repairs, is the more economical, and such construction can only be obtained with careful study and close observation of service. With engineers who are seeking to improve truck design there is no desire to adopt new or unknown principles or ideas, but there is every incentive to follow what has been established by experience as being sound engineering, and so far as is possible to improve upon these methods. The trucks that are today rated as standard with the industry are those that have been proven by work, and which have gained prestige with owners because they are economical in operation and maintenance cost.

The buyers of trucks who have knowledge of truck construction and engineering are not so greatly concerned in the units, if these are built by concerns of reputation, as they are in the details of assembly, because on these depend to a very large extent the quality of the machines. By this is meant that there is confidence in the products of manufacturers who are known, whose units have been proven in service, and who have sought to obtain public recognition. Not only this, such manufacturers have every reason to maintain reputation and have service organizations that have been carefully developed with the view of affording to owners every reasonable and practical assistance. There need be no uncertainty in the quality of what are known as standard units, but everything will depend upon the assembling and the quality of the parts that are seemingly of minor importance, but are equally essential.

Parts and Assembly Detail.

The truck buyer should examine with care the parts that were several years ago not given serious attention, which were regarded as secondary and were accepted as being satisfactory because they were designed or selected as being at parity with the principal units. For instance, the construction that will have the greatest endurance will have large size wherever subjected to stresses, the bolts and rivets will

be heavy, the means of securing the nuts and screws will insure against loosening, there will be sufficient space for work with tools when making adjustment or replacement, there will be protection of moving parts against accumulations of abrasives, all moving surfaces in contact will be adequately lubricated, and all metals will be high quality to have the largest degree of strength. Service longevity is obtained by proportioning of parts and the means of retention, as well as processes of treatment that afford endurance when subjected to wear.

Of course high grade construction units and parts are essential, but skilled work is equally necessary. Careful fitting, the use of perfect components and thorough inspection of all assembly details will insure the production of machines that will afford the service demanded and expected. The initial cost will be greater, but the expense of operation and maintenance will be comparatively small. The saving is obvious. A truck, for instance, that will cost \$1 a day less for service than another, assuming a maximum mileage of 100,000 and an average of 60 miles a day, will save the owner \$1500 in five years, to say nothing of other economies. Viewed from this aspect the machine that costs \$1000 more than another of similar capacity may be decidedly economical equipment.

Small Trucks for Special Work.

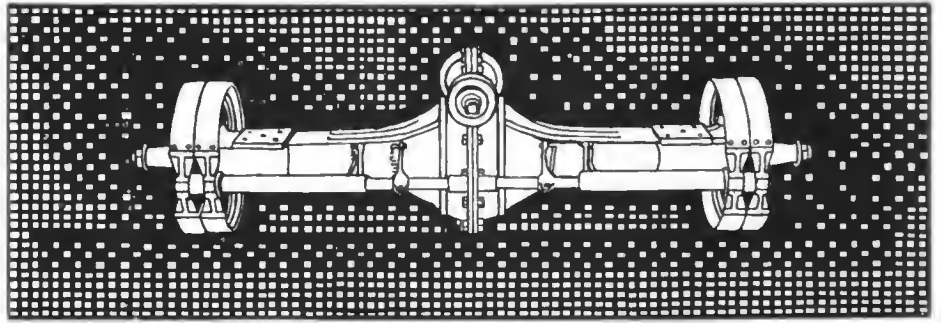
The foregoing facts are understood by power vehicle manufacturers and some of them are building machines that are specially designed for work where exceptionally hard service is demanded. These trucks are often comparatively small units that are intended shall be driven fast, that can be worked easily in comparatively limited spaces, and which will have all the equipment for rapid loading and unloading. Generally speaking what are known as all-purpose bodies are installed on chassis of less than two-ton rating for the reason that machines under 4000 pounds capacity are not designed for use with quick discharging equipment.

What is an excellent example of a truck designed for special work is the two-ton GMC that is designed as the "Coal Special," this being a type that is claimed to have maximum speed and endurance with equipment that will insure against loss of time unloading wherever gravity discharge is practical. The chassis includes a four-cylinder engine assembled with a multiple plate dry disc clutch and a selective sliding gear transmission gearset, that is suspended at three points. The shafts and bearings are unusually large and the power developed is considerably in excess of what would be required for hauling two tons in normal working conditions. The drive is through a two-section tubular shaft to a Timken worm driven rear axle. In general construction the truck is conventional, but in many details it is unusual. The transmission gearset has four forward speed ratios and reverse, so that in the event of work in soft ground or on steep grades the truck can be driven with full load, this insuring against being stalled from loss of traction. The rear springs are extremely long to afford unusual resiliency and protection against vibratory stresses.

Two Sets of Equalized Brakes.

The two sets of brakes are internal expanding, operating within drums on the rear wheels, and they are equalized so that there is the fullest degree of control at all times. All moving parts of the brakes are within the brake drums and are protected against abrasives and excessive wear. The drive is through radius rods that extend horizontally from the rear axle to long hangers on the frame side members. The rods are I section and when the chassis is loaded the rods are positioned to give a straight forward thrust, which obviates upward thrust that might cause excessive stress upon the frame. Ease of clutch engagement insures minimum starting stresses and lessened wear upon the tires.

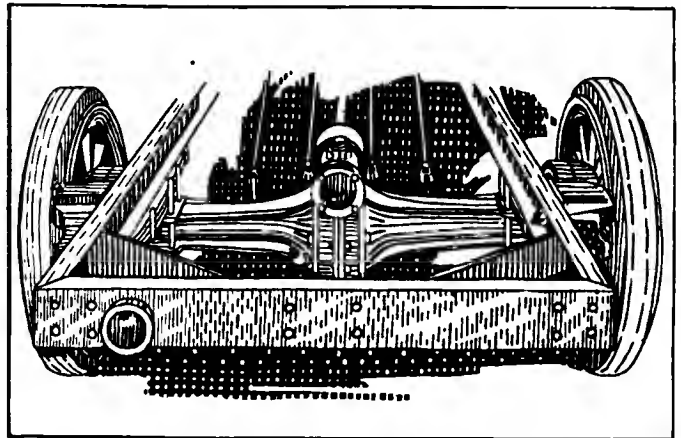
The radius rods are comparatively light and are pivoted on seats on the axle housing and are coupled with ball and socket joints at the hangers, there being a universal action and no strains upon them aside from the straight line forward thrust, no matter what the load or the deflection or re-



The Unique Two-Section Cast Steel Housing of the Semi-Floating Worm Drive Rear Axle of Chevrolet Trucks.

flection of the springs. The springs are made with a very slight arc and the action is correspondingly small. The spring and radius rod hanger is designed to have wide bearing on the frame and to distribute the load over a large area of the side member.

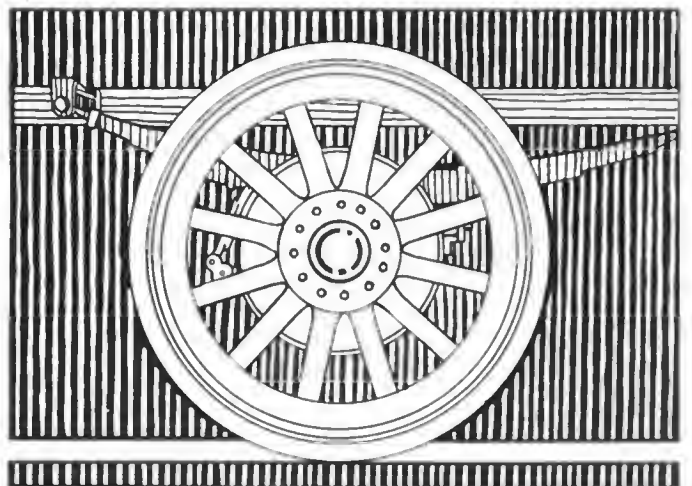
The steering gear of this truck is extremely simplified, the steering column base being carried in a casing that is



The Rear Frame Construction of Chevrolet Trucks. Showing the Diagonal Reinforcement and the Spring Suspension.

bolted to a bracket mounted on the left frame side member, the case being accessible from in front of the dash or by lifting the footboard. All of the moving parts are protected against dust accumulation and operate in ample lubricant. All adjustments to compensate wear can be made quickly, so there is never reason to have lost motion. When desired the gear can be removed as a unit by unbolting it from the bracket and uncoupling the connection with the drag link, a work that can be done rapidly. The steering gear condition is highly essential to safety, and the fact that it can be given attention at any time with comparatively no labor is an insurance against accident and expense.

Another illustration of the attention given to detail in the



The Rear Wheels and Spring of a Chevrolet Truck. Automatic Oiling Device and Large Brake Drums Being Features.

construction of this chassis is in the fenders. These are pressed from heavy sheet steel, each being a single piece, that are mounted at the forward ends on two large brackets that are securely anchored to the side members. The positions of the fenders are slightly adjustable and can be positioned either high or low as desired, and they can be quickly removed.

Good Design in Chevrolet Truck.

The constructional details of the new Chevrolet one-ton truck are specially interesting from the fact that the machine was carefully designed for hard service and bears no resemblance to passenger car design. The machine had a unit power plant with a four-cylinder engine having 3 11/16 inches bore and 5 1/4 inches stroke, which is rated at 21.75 horsepower by the S. A. E. formula. The clutch is a cone type and it is not enclosed, but the transmission gearset housing is assembled with the engine by a housing that covers the upper half of the clutch and the flywheel. The front of the engine is suspended on shackles that are securely bolted to the support arms and to the frame, this construction insuring the engine case against the stresses of chassis distortion. The transmission gearset has three forward speed ratios and reverse.

The power transmission system has a large tubular shaft in two sections, with three universal joints, the rear end of the forward section being mounted in a bearing supported by a central cross member of the frame. The rear axle is a worm shaft and wheel type that is unusual in that the housing is in two sections, it being steel castings that are belled to form a housing for the differential gearset and worm wheel, having longitudinal ribs approximately 90 degrees apart that greatly strengthen it. The tunnel for the worm shaft and its bearings are formed in the halves of the housing, it being divided vertically. The seats for the bearings carrying the differential gearset are machined in the housing, and when the driving members of the axle are assembled they are securely retained. There is no possibility of change that would require adjustment, save through wear.

The axle is a semi-floating type, with the outer ends of the driving shaft carried on bearings seated in the ends of the axle housing. The entire assembly is very simple and when assembled there is practically no provision for adjustment. In fact adjustment is not considered, for with adequate lubrication there is comparatively no reason for wear. The brake shoes are mounted on flanges at either end of the housing and the brake shoes, which are internal expanding, are actuated by a rocker rod or shaft, on which is fitted sleeves at either end, the center and ends of the rod being carried in the brake flanges and the webs that when bolted together form a reinforcement at the joint of the central section of the differential housing.

Frame is Strongly Constructed.

The frame of the truck chassis is formed of pressed steel channel section four inches width, with wide webs, that is 35 1/4 inches wide at the rear and 30 1/2 inches wide at the forward end. This is strongly reinforced with diagonal braces from the rear member to the side members, and there are two central cross members, one directly behind and the other, which carries the bearing supporting the rear end of the driving shaft, ahead of the spring hangers. This insures flexibility under load stresses.

The springs are semi-elliptic, the forward set being 38 inches long and 2 1/4 inches wide, and the rear set 54 inches long and 2 1/2 inches wide, the rear set being mounted outside the chassis frame side members. The springs are comparatively flat, with unusually large numbers of leaves to afford maximum resiliency, and the leaves are maintained in position by double ribs punched in each leaf, which fit into notches made in the leaves by the formation of the ribs. Rebound clips securely retain the leaves, so there is no excessive strain upon the main leaves. The spring eyes are fitted with funnel-shaped channels so there will be a flow of lubricant to the spring bolts, and the bolts are hardened and ground and grooved for the distribution of the oil, and they will not turn in the brackets. All the spring and shackle bolts are fed with lubricant by wicks from oil tanks cast in the brackets, these tanks being closed by wing nuts. When

once filled the springs will be automatically lubricated for a long time without further attention, and there is little reason to apprehend excessive wear from neglect.

WHAT NEW YORK OWNERS THINK.

A pamphlet published by the Internal Motor Co., builder of Mack and Saurer trucks, entitled, "What New York Owners Think of Mack Trucks," is a decidedly interesting piece of publicity. It is given over to a series of letters from owners of trucks who are operating in New York City and vicinity, which reflect experience for widely varying periods of time. The book also contains numerous illustrations, showing in some instances the types of body equipment used. In all 37 letters are presented. Besides there is a list of 77 different concerns in New York City which own from three to 410 trucks. Incidentally 144 Mack trucks are owned by the municipality, 139 of these being in the fire department service.

"THE DRAGON."

The above caption is the title of a very modest magazine that is to be published bi-monthly in the interest of ball bearings by the Fafnir Bearing Co., New Britain, Conn. The connection between the apparently incongruous title and the company and its industry is explained to be that a dragon such as might be read or told of in Old World legends, more familiar to childhood than any other period of life, bore the name Fafnir, now the name of the company. Space is given to presenting interesting facts relative to the uses of Fafnir bearings, which is well illustrated, and to general information concerning the company and the activities of its employees.

CLARK EQUIPPED TRUCKS.

"Two Heads Are Better Than One" is the title of a booklet published by the Clark Equipment Co., Buchanan, Mich., which is very largely devoted to description of the design and the qualities obtained in Clark internal gear driven rear axles for truck construction and Clark cast and pressed steel wheels for truck service. The booklet is admirably designed and printed and it contains besides mechanical facts some interesting detail of the ideal plants of the company at Buchanan.

NEW SIZES OF TORBENSEN AXLES.

The Torbensen Axle Co., Cleveland, O., will shortly begin the production of its new type 3 1/2-ton axle, and the experimental work with the five-ton axle has well advanced, one of these being in the observation of engineers of the International Motor Co., New York. The Torbensen company is now producing 175 rear axles a day, and this will be considerably increased with the production of the large sizes.

BOLLSTROM MOTORS CO.

With authorized capital of \$3,000,000 the Bollstrom Motors Co. has been organized at Detroit to engage in the manufacture of farm tractors and trucks under the Bollstrom patents. Guy Hamilton has been named general manager of the company. The concern has acquired 55 acres of land and leased an additional 100 acres in Marion, Ind., and proposes to construct a large plant in that city.

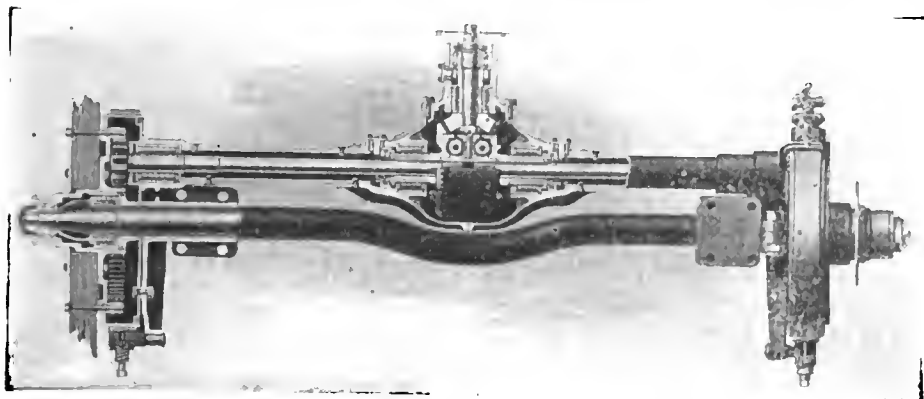
John Younger, formerly chief engineer of the truck department of the Pierce-Arrow Motor Car Co., Buffalo, has been made supervisor of engineering for the Motor Transport Section of the Quartermaster Corps and located at Washington, D. C.

Statement is made that the Packard Motor Car Co., which has not built four-ton trucks since late in 1916, will build 400 machines of this size and will have them in part at least in readiness for delivery early in the summer.

New Series Clark Internal Gear Rear Axles

With 36-inch wheels the road clearance is 12 to 13 inches and with 40-inch wheels, such as are used on heavy duty trucks, the clearance is from 12 to 14 inches.

The dead axles of all sizes are drop forged from 1½ per cent. chrome nickel



Sectional View of Clark Light Internal Gear Driven Rear Axle, Showing the Jackshaft and Brake Drum and Wheel Spindle.

A new series of internal gear drive rear axles for trucks, which consists of seven sizes, is now being produced by the Clark Equipment Co., Buchanan, Mich., the load rating of which ranges from 1000 pounds to five and six tons. The principles of design are similar in all of these, but the proportions of the parts differ in ratio to sizes. The axles having load capacities from 1500 pounds to three tons, differ slightly from those of greater capacity, the torque of these being taken through the jackshaft or live axle, which is bolted to the dead or load carrying axle. The units are bolted at the spring centres, which is the point of least deflection. In constructing the larger axles the torque stresses are sustained by cross members, which are bolted to the brake flange at the outer ends and to the gear cases at the centres of the driving axles. This insures adequate flexibility. In all sizes of axles the torque is taken directly through the springs and is not communicated to the load carrying unit.

There is no connection between the jackshafts and dead axles at the centres, so that vibratory stresses of the latter are not transmitted to the driving member. This is maintained to insure long endurance for all driving parts and bearings. In all Clark axles the jackshaft is placed ahead of the dead axle, with which construction there is a shorter driving shaft, which is maintained to afford greater endurance of universal joints through the elimination of shaft "whip," while the load on the bearings is minimized.

The load ratings and the carrying capacities on the spring pads of the different axles are as follows:

Model	Rating	Carrying Capacity on Spring Pads
A	½-¾ ton.....	2,500 pounds
AS	¾-1 ton.....	3,000 pounds
1	1-1½ tons.....	4,200 pounds
2	2-2½ tons.....	6,500 pounds
3	3-3¾ tons.....	11,000 pounds
4	4 tons.....	15,000 pounds
5	6 tons.....	18,000 pounds

steel, with wheel spindles integral, that are heat treated. The jackshafts are contained in substantial steel housings. The one and two-ton axles can be fitted with M & S locking differential gearsets manufactured by the Clark company, or these and the larger sizes can be equipped with the conventional bevel gear and pinion type gearset, built by the Brown-Lipe-Chapin Co. The bearings used in the axles are Hyatt, New Departure and Bower with SKF spherical seated thrust bearings at either side of the differential gearset. The SKF bearing is self-aligning and will adjust itself to any slight variation in the setup of the differential. All the bearings are claimed to be over size according to the manufacturers' ratings and are non-adjustable. All finished surfaces are rough turned and ground to limits, thus obtaining absolute accuracy in the mounting of all bearings and other parts.

The shafts of the jackshaft are the best quality of heat treated chrome nickel steel. The pinion and the differential gearset gears are 3¼ per cent. nickel steel, double heat treated, carefully tested for hardness and endurance. All parts through the axles subjected to excessive wear are bushed with phos-

phor bronze. The gear reduction of the light axles is six to one, that of the medium axles eight and 10 to one, and on the largest sizes either 11 to one, 12½ to one or 15 to one. The pinion shaft bearings are thoroughly lubricated from the lubricant in the housing of the differential gearset and hard felt washers throughout the axles exclude dirt and retain the oil. The internal gears may be lubricated by openings into the chambers enclosing the gears that are covered with hand plates.

All parts of the axles are readily accessible for repairs or replacements and all parts are interchangeable, fitting either right or left. The brakes are large size and the shoes are faced with lining of the finest quality, which insures endurance in long service. The axles are designed for use with any type wheel and all wheels can be removed without damage to bearings or gears, as no mistake can be made in replacing them.

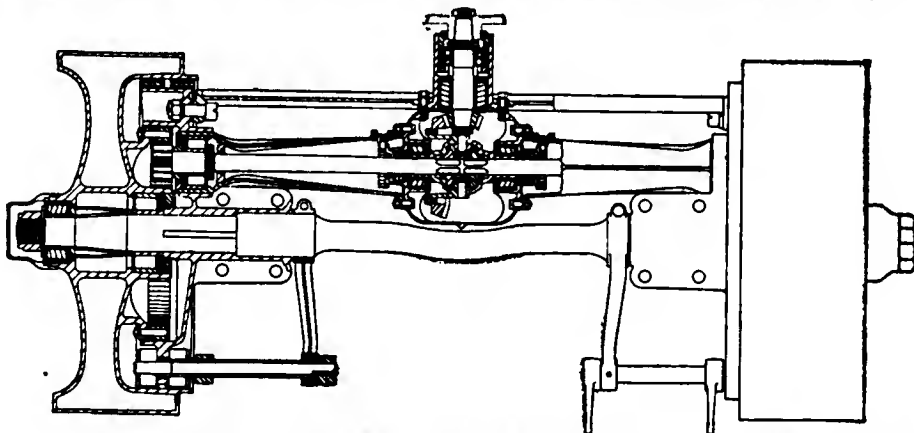
These axles have been known and were sold under the name of Celfor, but with the merging of the Celfor Tool Co. and the Buchanan Electric Steel Co. into the Clark Equipment Co., the trade name was changed and the axles are advertised and sold as Clark internal gear drive units.

GARFORD TRUCKS OVERLAND.

Practically all of the shipments of Garford trucks from the factory at Lima, O., for destinations within 1000 miles are now driven overland, at least to such sections of the country where the roads are passable. One train was driven from the factory to Boston a few days since that was made up of large chassis on which were carried smaller chassis. This train was nearly two weeks making the trip because of the poor condition of the highways.

A receiver has been appointed for the Pull More Motor Truck Co., Pittsburgh, Pa., the insolvency of the concern being admitted by W. S. Craig, assistant secretary, who joined in the petition for the appointment of a court directed controller.

A service station has been established by the Willard Storage Battery Co. at 106 West 63rd street, New York City.



Drawing of Heavy Type Clark Internal Gear Rear Axle, Detailing the Construction of Jackshaft, Gearset and Brake, and a Wheel Section.

WILL NATION CONTROL ROAD REPAIR?

Only by Systematic Survey and Maintenance to Standard Can Highways Be Preserved and Vehicle Haulage Cost Be Minimized



Mack Truck Chassis Equipped for Making Survey of Highway Surface Condition to Determine Nature and Extent of Needed Repairs.

INCREASE of highway haulage is regarded by all business men as the only relief that is possible for the overburdened railroads. Railroads must be used to whatever extent is necessary for war purposes. After these have been met the demands of industry and commerce shall be satisfied so far as is practically possible. The highways exist. They represent vast expenditures of public funds, raised by taxation for the benefit of the people as a whole. They were built for vehicular traffic and if used they must be worn in proportion to the traffic. If worn they must be repaired or the investment they represent is wasted. The more thorough and systematic the repair the less will be the cost of restoration.

The highways must be used to a greater extent than ever before. The government is sending all trucks built for its

various departments over the roads from the factories to the points of delivery. All trucks produced by manufacturers, so far as is practically possible, are driven on the roads to the branches, agents or buyers. Business men are sending commodities of all kinds long distances by truck because of the uncertainties and delays with reference to railroad or other shipments. The government is delivering the greater part of the mail on its rural routes by automobile. It has planned a large extension of the parcel post routes with the use of trucks.

The Highways Transport Committee of the War Industries Board, which is a part of the organization of the Council of National Defense, is urging the use of trucks for interurban, intercity and interstate haulage. It is stimulating the organization of "return load bureaus" in

all commercial centers, so that there shall be increased haulage of freight on the main highways. It is promoting the organization of so-called "rural express service" with a view of transporting produce from farms to consumers direct. Various governmental departments are using trucks for long distance haulage where time is a factor of importance, although "government freight" is expected to have the right of way in shipments.

All Road Work Restricted.

The object of the foregoing statement is to establish that the government itself is using trucks on the highways to an extent little realized by the people; that it is through its special departments urging truck transportation to relieve the railroads wherever this is practically possible. Wherever trucks shall be used there will be wear of the highways and need of repair.

Despite these facts, and despite the fact that commercial and industrial interests are also increasing the use of the highways, announcement is made by the Fuel Administration and the Department of Agriculture through its office of public roads, that the use of oil and coal products in road work must be limited, and that construction, maintenance or reconstruction cannot be undertaken without approval of a committee, of which Logan Waller Page, director of the office of public roads, is chairman, representing the Fuel Administrator and the Department of Agriculture. This approval must be obtained before the materials (petroleum oil, asphalt or coal tar) can be supplied by the manufacturers to the contractor or executive doing the work. Statement is made that the state highway departments are required to pass upon all applications for material for work, which must necessarily apply to all municipalities in all states, and these will be submitted to the committee and recommendation will be made by the committee to the oil division of the Fuel Administration, which will issue permits in accordance with the recommendations.

In other words, a committee at Washington is to determine the need of any



Maintaining a Bituminous Road: At Left, Covering Patch Consolidated by Tarring and Hand Tamping with Stone Screenings; at Right, Break in Road Surface Caused by Bitumen Burning in Mixer—If Not Repaired Surrounding Area Will Gradually Disintegrate.



Repairing Bituminous Highway Surfaces: At Left, Tarring the Patches and Brooming the Patching Stone; at Right, Continuing the Hole Excavated for Repair with Tar Before Filling It.

highway work and release whatever material may be necessary to do construction, maintenance or reconstruction. Orders cannot be given material manufacturers or producers until after governmental approval has been obtained. Whatever the government determines is necessary should be accepted without criticism. But the subject is so broad and the needs of the country so great with reference to highway construction and maintenance, that there should be fullest understanding that there may be cooperation and the work that is necessary should be given precedence.

Much Highway Bituminous Paved.

Few persons realize that the greater part of all streets and highways of the country are constructed with asphalt, tar or heavy oil, and that the mileage of paved roads (either brick or concrete) is comparatively small. One reason for this is the smaller cost of tar highways, and the other is that the materials with which tar or bituminous macadam roads can be constructed are generally obtainable in all sections of the country. In the East, for instance, there is but little concrete, though in some of the western states it is a considerable part of the construction. In New England there is very small concrete road mileage, but practically all of the state roads have been constructed of macadam, much of which has been built with refined tar, applied either by penetration or by mixing. Some of the water bound macadam

has been protected by applications of tar and oil, and some gravel roads have been oiled.

New England has been building state roads upwards of 20 years, and while macadam was first almost the universal material, later on tar was used in increasing quantities each year. In the cities and many of the towns stone or asphalt or bituminous paving has been constructed, which, while costly, is regarded as being the most economical. But with few exceptions all of the highways between commercial centers are macadam, the character of construction with reference to the use of bitumen or oil being dependent upon the importance of the highway and the resources of the state or the municipality. How great is this mileage of macadam highway treated with bitumen cannot be definitely stated. The ratio it bears to water bound macadam cannot be accurately told. Of course the mileage of macadam and bituminous macadam highway is small when compared with the total highway mileage of the country, but it represents a very large expenditure of money, both for construction and maintenance.

Why Tar Roads Are Built.

The highways may be classified as dirt, gravel, macadam, concrete, brick or stone paved, asphalt, bitumen or bituminous. Dirt is seldom improved, gravel and macadam may be oil treated, because this is probably the most efficacious manner of suppressing dust, but it

does not materially increase the endurance of the construction. Stone and brick paving are used more generally in cities where the traffic is heavy and the mileage comparatively small, and asphalt is often used as a means of deadening noise. It is not more enduring than good tar macadam and the cost is comparatively high. Concrete construction has been used more for country highways than any other aside from tar, but the high cost has limited its use generally. Tar, usually refined, is regarded as the cheapest form of permanent construction, for when applied either by penetration or by mixing it makes an excellent roadway with the materials that are ordinarily used for macadam, and which are as a rule more readily obtainable than any others.

The best road builders of the country maintain that the cheapest and quickest built permanent roadway is bituminous macadam, and this theory is substantiated by determination of the government, which in 1916 constructed several military highways in Texas of this material and last year practically all of the roads at the national cantonments in different parts of the country were surfaced with tar macadam. These highways were subjected to very heavy traffic and with reasonable care they were found to give excellent satisfaction, for they can be readily repaired by patching, and if systematically maintained there should be no reason for general reconstruction work.



Maintenance Equipment Can Be Improved or Specialized: At Left, Outfit Used by a Southern Road Building Contractor—A Steam Roller, Water Tank Wagon and a Tar Sprayer; at Right, a Tar Applying Tank Truck with Apparatus Designed for Controlling Heating and Volume of Coat, with High Pressure Distribution.

Freightage of Road Materials Limited.

Months since the government, because of the shortage of railroad cars, proclaimed that it would not release cars for shipment of road construction unless there was urgent need in connection with what might be regarded as war work, and there was supposition that this ruling continued. There is probability, however, that this was applied to the haulage of sand, gravel, crushed stone, cement and similar materials and equipment, and the present ruling applies specifically to petroleum and tar products. Obviously petroleum must be refined and the asphaltic residuum that is used to some extent in road work must be hauled in tank cars. Where asphalt is the main ingredient this is either obtained by vessel from Trinidad or Venezuela, or from Southern California, being transported either by vessels, which are imperatively needed for transports, or by transcontinental railroad hauls, which are long and require considerable time.

Sand, gravel, crushed stone or cement, however, can be usually obtained within comparatively short distances, but the tar is a product of illuminating gas plants and coke ovens, and must be transported from these to refineries and thence to the places where construction

road bed, the treatment of the tar, and, of course, the drainage. All of these factors are equally as important with any form of construction, aside from the use of tar. The thickness of the road bed and the degree of consolidation of the sub-grade and the stone courses may be accepted as the factors affecting endurance. All will depend upon the value of material and labor put into the work.

But the tar construction has undeniable advantages in that work may be rapidly done and when built it can be maintained at comparatively small expense if repairing is consistent and patching is systematic. With simple and inexpensive hand tools and equipment the most practical of repairs can be done. No highway can be neglected until reconstruction is necessary and then cheaply repaired. Maintenance work ought to be

done West, Chicago, Detroit and other points in Ohio, Indiana, Illinois, Michigan, Wisconsin and other states. For instance, one route is from Chicago East through Toledo, Cleveland, Buffalo, Rochester, Syracuse, Albany to New York and Boston; another is the Lincoln Highway. These two routes are generally followed because they reach the principal shipping ports between Portland and Norfolk and because they have been systematically improved for a considerable part of their lengths.

There are innumerable highways connecting the larger cities, not included in the long or main routes, that are from every point of view quite as important, especially as the inadequacy of railroad facilities necessitates road haulage, and in very large volume if business demands are to be met. Until there was need

of very general use of trucks, and long hauls were imperative where time is a factor, the condition of these roads was at least secondary. Now in many instances there is quite as much need of making these highways at least as practically passable as the main roads, and because of the extreme conditions there is no measure by which the actual needs, so far as business is concerned, can be determined.

For this reason there is



Some of the Necessities of Repairing Roads: Above, Portable Tar Kettle Used by the Massachusetts Highway Commission; at Left, Sweeping Roadway to Remove Dust and Have a Surface Clean for Penetration; at Right, Horse Drawn Sand Distributor Spreading a Top Coating on a Tar Macadam Way—This Is the Final Work.

is to take place. Only car shortage would be a logical reason for limiting road building, unless there was a purpose of conserving labor. The latter, however, does not appear probable, for much of the road work could be done by those who are not essential to other industries. Not only this, harvesting, for instance, need not suffer, because highway building could be suspended for the time when help is greatly needed on farms.

Quality of Bituminous Roads.

There is no limitation as to the quality of highway that can be built with tar products. All depends upon the engineering, the depth of excavation to form a sub-grade, the consolidation of the surface of the sub-grade, the depth of the road bed, the consolidation of the

road bed, the treatment of the tar, and, of course, the drainage. All of these factors are equally as important with any form of construction, aside from the use of tar. The thickness of the road bed and the degree of consolidation of the sub-grade and the stone courses may be accepted as the factors affecting endurance. All will depend upon the value of material and labor put into the work.

Long Main Highways.

Practically all states have systems of highways that have been planned and developed with the object of having first of all through channels for traffic. Between these and to the principal commercial centers are connecting roads. Some systems have been practically completed so far as the main roads are concerned, and in the New England and Atlantic coast states, and to a considerable degree in the Middle states, a very large part of the state roads are constructed of bituminous macadam. These highways are used very largely in driving to and from the principal cities in the Mid-

no basis for judging what is necessary construction, maintenance or reconstruction work on highways other than by actual surveys, which can be systematically done and to definite standards; which can be submitted to any authority with assurance that the facts will be uniformly presented, no matter what the conditions of the roads. Only by uniform reports can recommendations be fairly made. Without question the highways differ very greatly with reference to surfaces. Some of them have been subjected to very heavy traffic for a year, but especially during the last winter, and repairs are imperatively needed, not only to economize operating and maintenance costs of trucks and other vehicles, but to minimize the expense of restoration of the

road surfaces.

If repairs are neglected the expense of traffic over the roads will be constantly increased, and this must be paid for by those for whom haulage is done. The wear of the road, if the traffic is heavy cannot be prevented, but the surface can be kept smooth and free from holes by patching. The secret of economic maintenance of highways is to begin maintenance immediately upon completion and to do this by a patrol system, with which the entire surface will be under observation and there will be no neglect. When so maintained there is seldom if ever interruption of traffic, no matter how heavy.

Maintenance Must Be Begun.

If repairs, with such construction as may be necessary to complete main highways and improvement of roads used for national, interstate or even intercity haulage, are to be undertaken, no time should be lost, because unusual care must be taken if these ways are to be so conditioned that transportation in largest volume can be continued through the coming winter. Few people realize the excessive cost of poor roads so far as transportation by vehicle is concerned. There are innumerable factors that enter into this expense, but leaving out the value of time, the loss of labor, the mechanical deterioration of the machines, and considering only fuel and lubricant, the cost a mile may be greatly increased. Assuming an expense of 30 cents a mile for a five-ton truck, which is a comparatively low figure and is only obtained on long hauls, with a consumption of a gallon of gasoline to every four miles and a gallon of oil to every 160 miles. The gasoline may be valued at 25 cents in quantities and the oil at 40 cents. This would make the cost of fuel and lubricant 6½ cents a mile.

One Effect of Poor Roads.

The best measurement of power required for driving a truck is by electrical instruments, which are extremely accurate. During the run of a General Vehicle five-ton truck from New York to Washington, carrying a 4½-ton freight, which was made the middle of March, between Wilmington and Newark, Del., 12 miles, a total of 240 amperes of current was used, or 20 to a mile, against an average draft of nine amperes fully loaded on city streets. This was an excess of 222 per cent. over normal requirements. The same ratio of power would be required for a gasoline truck. With this as a basis for illustration, and assuming the consumption stated above as normally required for a five-ton gasoline truck, the expense would be increased from 6½ cents to 14.43 cents a mile, or 7.93 cents, which would total \$7.93 for 100 miles.

Though one may assume that there would not be constant conditions that would require such large consumption of fuel, and the figure established would not be maintained for 100 miles, large volumes of gasoline and oil are often burned to extricate trucks when stalled in holes or ditched, or obstructed by snow. Last winter a truck stalled in snow

between Worcester and South Barre, Mass., burned 19 gallons of gasoline in moving 100 yards, and the driver a very careful and experienced man.

Making Survey of Necessary Work.

With reference to determining the conditions of the highways, for submission to authorities who may pass upon the repairing necessary, no better facts could be obtained than those recently collated by the International Motor Co., New York City, which equipped a truck chassis with a special body, a speedometer, odometer, gradometer, tachometer on the engine, vacuum gauge on the inlet manifold, oil and water temperature gauges, recordograph and tension dynamometer. The machine was driven between New York City and Washington, the record of the trip being made by the recordograph, an instrument that moves a tape by clock work giving time, under a pencil geared to a front wheel, giving distance. The speed of the machine up to a maximum of 45 miles an hour was governed by the road conditions. The vehicle was driven by William F. Stubner from Washington to New York, March 21, in 13 hours, an average of 19.2 miles an hour. Aug. 1, 1917, the same run was made with the same chassis, in eight hours and 40 minutes, an average of 29 miles an hour. The difference in time was due entirely to the condition of the roads. Both drives were made in dry weather. In other words, 50 per cent. more time was necessary purely because of the surface of the road being worn from heavy traffic.

The data obtained during the trip included a series of photographs, that showed road conditions clearly. With machines similarly equipped very large road mileage could be surveyed in a brief time, and were the vehicles driven by road engineers who could make recommendations very complete reports could be gathered. If there is any conclusion to be made with relation to the policy of the government it should be beneficial and not criticism. But instead of the government awaiting the action of municipalities, which would only be influenced by local conditions and requirements, it should require all towns, cities, counties and states to do whatever work is necessary to have the main highways restored as nearly as may be to the original condition, and that means be taken to maintain them, preferably by a patrol system or other form of supervision.

Having exclusive jurisdiction over the

distribution of the tar, asphalt and oil, the government can restrict or stimulate highway work wherever needed. One can safely assume that the cost of cement highways, and the control of freight cars by the nation for the haulage of construction materials, will probably defer all non-essential cement work until after the war. But existing tarred roads, so vital to industry and commerce, must be kept in best condition possible. Not perhaps to theoretical ideals, but to afford the largest practical degree of vehicle transportation economy. And the business men of the nation should use every influence that is consistent to have this policy established and carried out.

CLASS B WAR TRUCK SHIPMENT.

One of the contracts made by the Quartermaster Corps, U. S. A., for class B (three-ton) trucks, was with the Indiana Truck Corporation, Marion, Ind., which constructed a special factory unit for the purpose of producing the ma-



The First Fleet of Class B Trucks Assembled at the Plant of the Indiana Truck Corporation, Marion, Ind., Ready for Driving to an Eastern Delivery Point.

chines in addition to its regular commercial output. The trucks produced are driven from the factory to the East and to the different points of service or shipment. When a sufficient number has been built to equip a full company, which requires 33 machines, a convoy is organized and manned by soldier drivers sent away. The accompanying photograph is of a street scene at Marion just before the company left for "some eastern point," and thence to "Somewhere in France." As will be noted the trucks are formed in "fours," with a driver standing in front and slightly at the left of each truck, which was an arrangement to obtain a better photographic effect, and could not be done elsewhere save in a public square.

Announcement is made by the Fulton Motor Truck Co., Farmingdale, N. Y., that the list price is now \$1620 f. o. b. at the factory, and that all previous quotations have been cancelled.

Road Construction Material Car Supply

An order has been promulgated by the Railroad Administration relative to the supply of cars for hauling road building material and providing a committee to handle the requests for cars and shipments. This states that open top cars suitable for such traffic should be furnished preferentially for shipping coal, coke and ore. That open top cars, not available for transporting coal, coke and ore may be furnished for hauling stone, sand and gravel, and when so furnished shall be used preferentially for highway maintenance materials.

Open top cars suitable for transporting coal, coke and ore and available on coal, coke or ore producing roads in excess of the demand for such commodities, may be furnished for hauling stone, sand and gravel, and when so furnished shall be used preferentially for highway maintenance materials. The return movement to mines or ovens should be utilized wherever practicable in furnishing car supply for stone, sand and gravel. Every endeavor should be made, consistent with keeping up the production of coal, coke and ore, to furnish shippers of stone, sand and gravel with a minimum of 40 per cent. of their normal weekly transportation requirements.

Roads which are not producers of coal, coke or ore must not use foreign open top equipment for stone, sand or gravel shipments, except for one load in the course of the return movement to mine or oven. Where the transportation needs of essential road construction or maintenance projects cannot be met by car supply furnished in accordance with the stated rules, the state, county or municipal officials in charge of the work should, through their state highway department, apply to the director of the bureau of public roads, United States Department of Agriculture, Washington, for assistance.

Such applications will be considered by representatives of the Department of Agriculture, War Department, War Industries Board, Fuel Administration and Railroad Administration, and in accordance with the recommendations of such representatives the car service section will endeavor to furnish car supply necessary for the approved essential road construction or maintenance. Emphasis is made that car supply for stone, sand or gravel must not jeopardize the essential production of coal, coke or ore, and if such result becomes apparent on individual roads or generally, orders will issue to curtail the car supply for stone, sand and gravel.

GAS ENGINE MEETING.

A joint meeting of the National Gas Engine Association and the Mid-West section of the Society of Automotive En-

gineers will be held at the Hotel Sherman, Dayton, O., June 4, at which there will be a technical session, when papers on "The Mechanical Construction of Ignition Magnetos" will be presented by H. R. Van Derventer of the Sumter Electrical Co., Chicago, and on the "Hvid Engine," by E. B. Blakesley, advisory engineer of Sears, Roebuck & Co., Chicago. An informal dinner will take place in the evening at which George W. Smith, chairman of the Mid-West section, S. A. E., will preside. O. H. Fisher, president of the National Gas Engine Association and president of the Union Gas Engine Co., Oakland, Cal., will be one of the speakers. Special sessions of the National Gas Engine Association will be held at the Hotel Sherman June 3 and the morning of June 4.

GARCO DATA BOOKLET.

Information of much value to the automobile repairer is to be found in a booklet published by the General Asbestos and Rubber Co., Charleston, S. C., manufacturer of Garco brake lining. In it is listed the name of practically every passenger car and truck built, the different models of each year being listed by year or number, the data including the number of pieces of brake lining, the length, width and thickness needed for renewal of brake shoe facing. The information is thoroughly dependable and up-to-date. The company intended to revise the booklet from time to time. The print is a size to be carried conveniently in the pocket. A number of pages have been blanked for the addition of pencil notes. The booklet will be sent free to any dealer or repairer making request of the company.

WILLYS-OVERLAND OFFICERS.

The annual meeting of the stockholders of the Willys-Overland Co., Toledo, O., elected John N. Willys, C. A. Earl, James E. Kepperly, Edwin B. Jackson, C. O. Miniger, Royal B. Scott, F. K. Dolbeer, Edward F. Swift and Rathbun Fuller directors, and the directors elected the following officers: John N. Willys, president; C. A. Earl, first vice president; Edwin B. Jackson, vice president in charge of sales; C. O. Miniger, vice president in charge of production; James E. Kepperly, vice president and counsel; Isaac Kinsey, vice president; Royal B. Scott, secretary; F. K. Dolbeer, treasurer.

H. L. HORNING RESIGNS.

H. L. Horning, after a service of practically a year as chief of the automotive products sections of the War Industries Board, has resigned and will retire from the service as soon as his successor has been named and can take over the work. Mr. Horning will resume his connection with the Waukesha Motor Co., Waukesha, Wis. During his connection with the War Industries Board he has given invaluable service to the government.

Plans for S. A. E. Midsummer Meet at Dayton

A meeting of the Society of Automotive Engineers will take place at Dayton, O., June 17 and 18. The standards committee and the sections conference will take place June 16 at the Dayton Engineers' Club, the former at 10 in the morning and the latter at 8 in the evening. The proceedings of the professional sessions will be devoted largely to aeronautics, although there will be consideration of subjects relating to refining petroleum, tractor engineering and the design of heavy fuel engines.

Among the speakers will be W. B. Stout, technical advisor of the Aircraft Board, who will speak on "Present Day Problems in Aeronautics;" Fay B. Faure of the Curtiss Aeroplane and Motor Co. will talk on "Airplanes of Today," and F. W. Caldwell, aeronautic engineer of the Aviation Section of the United States Army will present a paper on propeller design; Archibald Black will read a paper on the design of exhaust mufflers for aeronautic engines. Reports on the International Aircraft Standards Conference at London will be presented by C. M. Manly, chairman of the Aeronautic Division of the S. A. E.; E. H. Ehrman, chairman of the Miscellaneous Division of the S. A. E. Standards Committee, and by General Manager Coker F. Clarkson of the S. A. E.

In addition there will be a paper on "Processes of Petroleum Refining" by C. W. Stratford, which will be illustrated by actual refining methods, and P. L. Scott and C. E. Sargent will have a symposium on heavy fuel engines. There will be a separate tractor meeting the afternoon of the second day. At the business session the morning of the first day reports of officers and committees will be presented and the work of the standards committee since last January will be submitted for approval.

In connection with the meeting there will be inspection of airplanes and engines at McCook field, a government experimental station, and there will be an exhibition of automotive apparatus for military purposes on a large scale. More than 700 reservations have been made for the Orville Wright dinner, which will be a feature of the meeting. President Kettering will make an address at the dinner and Gov. Cox has promised to be present.

The general arrangements for the meeting have been made by a committee consisting of David Beecroft, chairman; Herbert Chase, Fred E. Moskovics, F. E. Place and C. F. Scott. The Dayton S. A. E. committee consists of Orville Wright, honorary chairman; Vincent G. Apple, chairman; F. H. Hoover, Capt. Howard Blood, F. J. Bloese, Carl Ruest, John F. Hoffman, W. B. Stout and I. B. Swagles.



Parade in Cincinnati, O., of First Liberty Trucks to Leave the Factory of the United States Motor Truck Company.

ELECTRIC TRUCKS IN ENGLAND.

Electric trucks are used to a considerable extent in England for transporting coal from railroad yards and coal stores to electric power stations and other large users. One reason for utilizing these machines is the shortage of petrol and drivers and there is considerable difficulty in obtaining the attention that is ordinarily required for petrol trucks, as comparatively few garages and service stations have the facilities that were afforded previous to the war.

At Glasgow, Scotland, an electric truck is used by the Glasgow Cooperative Society to haul coal and it was worked 307 days out of 365, during which time it was unserviceable one afternoon and the morning following, this being a reliability coefficient of 99.65 per cent. Electric trucks have been used in this country for a number of years for coal delivery especially in New England, where a number of fleets are operated by large concerns.

The type of machine shown in the accompanying illustration is used by the Bay State Fuel Co., Boston, this being a five-ton vehicle with a body hoisted on four upright screws by means of a two-horsepower motor, adjustable to any height to a maximum of 39 inches. The body will lift $5\frac{1}{2}$ tons of coal in 90 seconds, using 26 amperes of current, and the body can be lowered in 60 seconds. All operations are controlled from the driver's seat.

PERFEX CO.'S EXPANSION.

The Perfex Radiator Co., Racine, Wis., manufacturer of radiators for trucks, tractors and passenger cars, has increased its capital from \$15,000 to \$1,000,000, and will carry out plans for expansion on a large scale. The company is a very large producer of tractor equipment.

Announcement is made that after June 1 the price of the Columbia two-ton truck chassis, built by the Columbia Truck and Trailer Co., Pontiac, Mich., will be advanced from \$1990 to \$2275.

U. S. WAR TRUCKS DELIVERED.

The first delivery of United States Army class B trucks built by the United States Motor Truck Co., Cincinnati, O., was an occasion of considerable importance in Cincinnati and Covington, Ky., where the factory of the company is located. The trucks, 15 in number, were paraded through the streets of the two cities, a band from Fort Thomas riding in one of the machines.

President R. C. Stewart, Vice President R. S. Stewart and General Manager Forrest J. Alvin, with President Charles Dabney of the University of Cincinnati, and Prof. Flaig, the last in charge of the military education of the students, accompanied the parade in a touring car. Incidental to the parade E. S. Lee, treasurer of the truck company, chairman of the Covington Liberty Loan Committee, and Mayor John J. Craig, were serenaded by the band.

In Cincinnati the parade was to the university grounds, where a program of patriotic exercises was carried out, the trucks being driven to the "field," the students being led by 500 Minnesota mo-

tor mechanics in command of Capt. R. L. Percy. President Stewart delivered the trucks and President Dabney responded, expressing appreciation of the fact that the university was the first educational institution to receive standardized Liberty trucks. The university received five of the machines and at the conclusion of the exercises the remaining 10 were driven overland to Camp Taylor at Louisville, Ky., where they are in the service of the truck training division of the post.

BOSCH IMPULSE STARTER.

An impulse starter, designed for truck and tractor service, has been produced by the Bosch Magneto Co., which will manufacture it commercially. The starter is a spring actuated type, there being two helical springs between the armature and the driving shaft. When the engine is cranked the armature is held stationary by a pawl and the springs are compressed. When the shaft has reached a certain point the armature is released and given a sharp turn by the recoil of the springs, which produces a spark of such proportions as will insure certain ignition in the engine cylinders. When the engine has reached 120 revolutions a minute the starter is automatically disengaged and the power is transmitted through the helical springs, which serve as a flexible coupling. With it hand cranking is not hard work.

CONTINENTAL AGAIN ACTIVE.

Production of trucks, probably a series rated at three tons load capacity, will be begun shortly by the Continental Motor Truck Co., Superior, Wis., which has been inactive for practically a year pending adjustment of a controversy relative to the erection of a factory building. The building is completed, has been accepted and will be equipped for practical truck construction.



Electric Truck, $5\frac{1}{2}$ Tons Capacity, in the Service of the Bay State Fuel Company, Boston, for Heavy Duty Work.

Americans to Build Military Roads in France

"When the history of this war has been written," says D. O. Skinner of the International Motor Co., "it will be more fully realized what a vital part good roads have played in the great struggle. At the start motor trucks leaped to the front as the modern pacemaker of flexible transportation, and ever-increasing war needs have demanded new roads and better roads as most necessary for the proper backing up of fighting forces.

"Motor trucks by the thousands will contribute an enormous advantage to United States road engineers engaged in new construction back of our lines. It is estimated that 1200 miles of highways will be built in 1918 by American road engineers in the rear of the firing line in France. To the special road building battalions is delegated the important

"Most of the roads of France are built of water bound macadam. The peculiar nature of the French soil, which is of limestone formation, lends itself readily to compaction under the road roller and makes a very good road building material, although it requires constant maintenance. The British, however, introduced the tarred surface road and an increasing mileage of that type is found back of the British lines. One of the principal objections to the water bound macadam road near the front is the dust which rises from it in dry weather under heavy war traffic. Clouds of dust draw artillery fire from the enemy, and for this reason United States engineers, in planning road construction and maintenance near the American front, will probably utilize large quantities of tar coating, which is freely obtainable in France.

"Of course the pressing object of American road construction is to provide for the immediate needs of our forces, but the work carries with it both utilitarian and historic value. When Caesar's Legions poured through Gaul and into Britain and returned to Rome again, they left in their wake military roads so carefully constructed that many

Goodrich Co. for five years and then in the solid tire department of the Goodyear Tire and Rubber Co. In 1905 he went to the Firestone Tire and Rubber Co., where for 11 years he had charge of the solid tire department, and for the last two years was engaged in research work in the development department and laboratory.

The solid tire division of the Mason company is nearly ready for production. The company has obtained its equipment and no expense will be spared to produce very high grade tires in every standard type and size. A highly efficient factory organization has been perfected and statement is made that the purpose of the Mason company is to begin where the old manufacturers leave off. The endeavor will be to make tires that will give maximum service for every load and condition of service.

CONSOL AUTOMATIC OILER.

Broad claims are made for the economy and efficiency of the Consol Automatic Oiler, manufactured by the Consolidated Machine Co., Detroit, which results are maintained to be due to the



United States Engineers' Road Building Equipment: At Left, Type of Apparatus for Applying Tar Coats to Highway Surfaces; at Right, Mack Truck Designed for Construction Work in France.

task of keeping lines of communication constantly open, and Mack trucks working in conjunction with modern American road machinery will help to build new strategic lines and keep communicating roads in constant repair. The Mack fleet will be composed of several thousand dump trucks, hot road oilers, pressure sprinklers for making water-bound macadam, gasoline tank trucks, printing press trucks for printing blue prints, instructions, plans, reports, etc., machine shop trucks, blacksmith and tool repairing trucks.

"Although France is particularly well endowed with good roads, it is often necessary for military reasons to construct many new lines. An estimate places the present mileage of French roads at one mile of road for each 1½ square miles of ground surface. The tremendous task of keeping these roads in perfect condition and building new ones at the same time can well be imagined when it is realized that so far as wear and tear are concerned war traffic is 10 times as great as that on Fifth avenue, New York City.

sections remain today as permanent monuments of their presence. American system and modern methods likewise promise to contribute many enduring benefits to France. Our road building battalions are going about their work scientifically and with an object fully as far reaching as the work of Caesar. All is not destruction that comes out of war and many American built highways will remain to become of immeasurable value to France in conducting her commercial and social intercourse."

CLOUGH JOINS MASON TIRE CO.

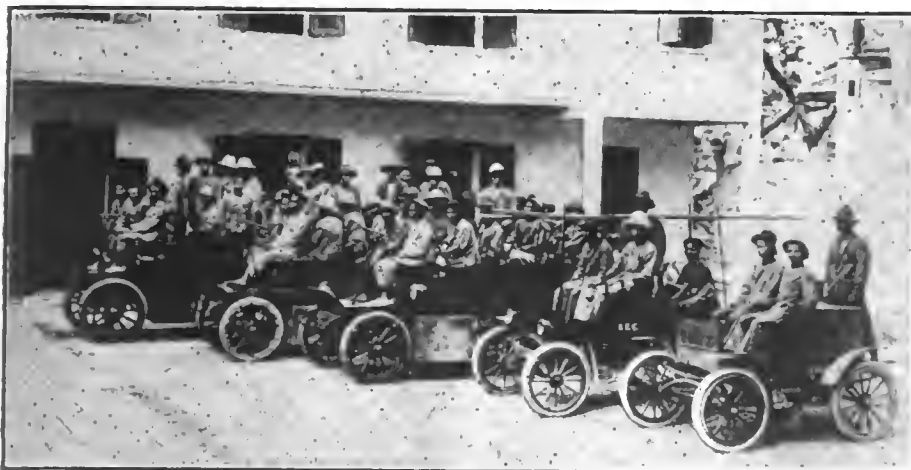
Lee E. Clough, whose life work has been devoted to rubber manufacturing, 18 years service being in the solid tire departments of the Goodyear and Firestone companies, has resigned to associate himself with the Mason Tire and Rubber Co., Kent, O., where he will direct the production of the solid tire department.

Mr. Clough was born in Akron in 1873 and was educated in the schools of that city, first being employed by the B. F.

extensive use of patented devices. The oiler is said to absolutely prevent leakage of oil on bearings when a power vehicle is standing, for vibration is needed to open a little ball valve that controls the flow of lubricant from the cup. The oilers are neatly made in several styles and finish. Several large concerns have placed orders for considerable numbers of oilers, which is regarded as recognition of the superiority of the device. The company has started production on a large scale and will shortly be prepared to accept contracts for substantial quantities.

In recognition of his service, W. A. Clare, for two years general sales manager for the Atterbury Motor Truck Co., Buffalo, has been made assistant secretary of the concern. He will continue to direct the sale of Atterbury trucks.

The Federal Motor Truck Co., Detroit, has appointed Arthur C. Leverton, formerly vice president of the H. L. & W. Sales and Manufacturing Co., its factory manager.



Fleet of Five Electric Vehicles Operated by the Siam Electricity Co., Bangkok, Siam, Two of Them Since 1904, for General Service.

ELECTRIC VEHICLE ENDURANCE.

According to J. L. Hansen of the Siam Electricity Co., Bangkok, Siam, who is now in this country, his company operates a fleet of five electric trucks, two of which have been used since 1904, or more than 13 years. The two oldest trucks are used for lamp delivery, while the larger machines are utilized by construction work and other general purposes. The trucks are driven by unskilled natives and have been found to be as economical as they are in this country.

Incidentally, the Siam company uses rice husk as fuel to generate electric energy, which is generally obtainable in unlimited quantities at small cost, but maintains a reserve of fuel oil in tanks, which is rarely if ever needed.

PATRIOTIC RUSSEL DINNER.

A patriotic dinner was given at the Hotel Pontchartrain, Detroit, by the Russel Motor Axle Co. to its directors, officers, heads of departments, assistants, shop clerks and office employees, primarily to celebrate the fact that the month's business was the largest in the history of the company. The details were arranged by George B. Russel, secretary and treasurer. There were several speakers, including George B. Russel, who spoke on service to the country. Mr. Russel pointed out that since Jan. 1 more than 1700 truck transportation companies had been formed for intercity deliveries, which was due to general recognition that power trucks service was the logical transport for the excess freightage that could not be handled by railroads. He impressed upon those present that conscientious devotion to duty was a real service, though workers were not enlisted for war work.

Among the other speakers were Dr. B. H. Lawson, W. A. Smith, Assistant Manager Henry Russel and H. M. Riggs, manager of the gear department. The entertainment included a musical programme and a series of moving pictures, in one of which, "The Power of the Petticoat," one of the principal parts, was assumed by George B. Russel.

NEW NASH TRUCK PRICES.

The Nash Motors Co., Kenosha, Wis., builder of Nash trucks, announces that June 1 the prices of these machines will be increased, the values being f. o. b. Kenosha, and not including war taxes. This is the first advance since prices were established Aug. 1, 1917. The model 2017, one-ton, will sell for \$1595; model 3017, two-ton, will sell for \$2075, and model 4017 (Quad), two-ton, will sell for \$3250, which is the same price now charged. The prices of passenger cars have been increased, but the coupe and seven-passenger touring cars are new models and the prices for these are just announced.

HOYT JOINS THE OAKES CO.

George W. Hoyt has resigned as chief engineer of the Harroun Motor Corporation, Detroit, to become chief engineer for the Oakes Co., Indianapolis, Ind., where he will have charge of engineer-

ing and development work incidental to the production of Oakes cooling fans. The change will take place June 1. Mr. Hoyt was designing engineer for the Amplex Motor Car Co. for six years, was with the Marmon company for three years in a similar capacity, was assistant chief engineer for the Maxwell company for two years and was with Ray Harroun during the period Maxwell cars were being exploited throughout the country.

REPUBLIC OUTPUT DOUBLED.

Statement made by the Republic Motor Truck Co., Alma, Mich., shows remarkable production, which would appear to demonstrate that not only is business "as usual," but the volume of sales and deliveries is approximately 100 per cent. larger than a year ago. During the nine months ending April 1, 1918, the company built and delivered 11,400 trucks and the cash receipts for that period were \$12,000,000, against a production of 5900 trucks and cash receipts of about \$6,000,000 during the nine months period ending April 1, 1917.

Emphasis is made that this increase is regular business and does not include so-called war orders, and claim is made that the figure quoted would have been exceeded had not the shortage of materials, congestion of shipping facilities and bad roads that lessened "drive-aways" all militated against production and distribution. The company is now producing 60 trucks a day, according to Vice President Lafayette Markle, or approximately 2000 machines a month, and he believes this output will be considerably increased in a few months.

The Standard Motor Truck Co., Detroit, has been elected to membership in the National Automobile Chamber of Commerce.



The Company at a Patriotic Dinner Given by the Russel Motor Axle Co., North Detroit, to its Directors, Officers, Heads of Departments, Shop Clerks and Office Employees.

Industry Pledges Resources for War Work

At a meeting of the directors of the National Automobile Chamber of Commerce held in New York City the production committee, consisting of W. C. Durant, chairman, of the General Motors Co.; John N. Willys of the Willys-Overland Co., John F. Dodge of Dodge Brothers, Walter E. Flanders of the Maxwell Motor Co., C. C. Hanch of the Studebaker Corporation and Hugh Chalmers of the Chalmers Motor Co., made report of conference with the War Industries Board, War Department, Railroad Administration and other governmental departments relative to supplies of raw material and transportation. The committee represented the needs of the government were very great and reported that it had conceded these demands should be given priority and volunteered all possible assistance and had pledged the entire resources of the industry to furthering the war work, keeping in mind its accomplishment with the least possible effect upon general business. Until the needs of the government are definitely stated the industry, in addition to manufacturing airplanes, tanks, tractors, shells, mine anchors, helmets and other munitions, will apply itself to assisting in solving the problems of transportation. The committee is working in harmony with the War Industries Board.

The traffic committee reported that during the first three months of 1918 38,900 machines produced by eight of the largest manufacturers had been driven from factories by dealers, this being about 33 per cent. of the production of these concerns. Driving the vehicles overland released about 10,000 freight cars for other railroads purposes. The roads committee, because of the increase of interstate highway traffic for the relief of railroad congestion, expressed the belief that there would shortly be a Federal authority established to determine the policy of the government with refer-

ence to the use of roads, with power to direct the administration of interstate highway commerce. A resolution was passed urging the Federal government and the states of the Union to adopt a highways policy so that the roads could be used to the fullest degree for freight transportation.

Report was made by the commercial vehicle committee that the truck manufacturers having membership in the chamber had increased production more than 100 per cent. for the first three months of 1918 as compared with the same period of 1917. The National Motor Truck Committee made report of its work in connection with rural truck delivery and the increasing number of return loads bureaus established throughout the country. An appropriate resolution on the death of Col. George Pope, for years one of the most prominent members of the chamber and its preceding bodies, was passed.

HEAVY INTERCITY TRAFFIC.

Statement is made from the office of the Du Pont companies at Wilmington, Del., that the traffic on the highways between New York City and Philadelphia is very heavy, there now being 640 trucks making 7200 trips each week. These are assumed to be five-ton loads, and on this basis represents approximately 36,000 tons of freight, or what would load 720 50-ton freight cars if hauled by railroad. This would make 20 trains of 36 cars each. The distance is about 95 miles. Besides the actual haulage at least two handlings and door to door delivery is made.

OPERATES 50 FREIGHT TRUCKS.

The Beam-Fletcher Co., Philadelphia, Pa., now operates 50 trucks in general highway freightage, 30 of these between Philadelphia and New York City, and it has regular service between Philadelphia and Reading, Pa., Philadelphia and Easton, Allentown and Bethlehem and Philadelphia and Vineland and Millville, N. J. One line covers the Vineland-Millville route and Hamonton and to New York, returning to Philadelphia.

WHERE TO TEST POWER TRUCKS?

An extremely interesting situation has developed at Lima, O., where the Gramm-Bernstein Motor Truck Co. and the Garford Motor Truck Co. are building trucks, many of them of large size for the United States War Department. After the trucks have been built they are tested on roads. The Andrews Asphalt and Paving Co., Hamilton, O., which built the asphalt streets of Lima, stated to the city's officials that testing the trucks on the asphalt damaged the paving. This led to representations to the truck companies that the trucks were the cause of excessive wear. The truck companies agreed to use routes from the factories that would not be on asphalt and one of them proposed to use the macadam roads of Shawnee township.

This proposition was followed by a conference of the township trustees of Allen county, the county commissioners and the street committee of Lima with representatives of the truck companies, the township and county officials objecting to the use of the macadam roads for testing when these were wet or muddy. An agreement to use macadam roads so far as possible was reached. The fact that the trucks are for the use of the army and must be tested thoroughly appears to be secondary to the patriots who construct and maintain roads in that section of Ohio, so long as they can have highways that are unworn by traffic or through the trials of trucks that are absolutely necessary for prosecuting the war.

TRUCKS IN BOND DRIVE.

During the campaign for the sale of Liberty Bonds recently closed the people of Lima, O., considerably over-subscribed the quota fixed for the municipality. The local and district committees were active in organizing a demonstration to arouse enthusiasm in the subscription, and among other means of stimulating interest was a street parade in which many thousands participated. One of the features of this event was 11 trucks, from the factory of the Garford Motor Truck Co., upon which were shown different tableaux typifying activities of American soldiers "Somewhere in France," the Red Cross and other branches of the national service. The accompanying illustration is representative of general appearance of the machines.

The actual production capacity of the steel industry is to be determined by a committee representing the War Industries Board and the steel manufacturers so that there will be better knowledge of the possibilities for construction.

The United States Motor Truck Co., Cincinnati, O., has been awarded a contract for 500 class B trucks for the Quartermaster Corps, U. S. A. The total value of the order is stated to be approximately \$350,000.



One of a Fleet of 11 Garford Built Liberty Army Trucks Used in a Liberty Bond Parade in Lima, O.

GMC Sells Branch to Noyes-Buick Co.

The General Motors Truck Co., has sold its New England branch at Boston, which was distributor for 63 different agents in New England, New Brunswick and Nova Scotia to the Noyes-Buick Co. of Boston, which has assumed control of the power vehicle distribution in the territory specified. The transaction is one of the largest in the motor truck industry in New England and this places in the hands of the Noyes-Buick Co. the wholesale handling of GMC trucks and the retail sale of these machines in the Boston district.

The intention of the Noyes-Buick Co. is to maintain the GMC branch and service station in Commonwealth avenue for wholesale distribution of trucks and service, and the retail sale of trucks will be directed from the sales room of the Noyes-Buick Co., which will be continued unchanged. The wholesale business will be in charge of M. E. Brackett, who has been manager of the GMC branch for the past five years, and who has developed the business to its present proportions.

"MOTOR TRUCK PROBLEMS."

The Merchants' National Bank, Boston, has published a booklet entitled the "Motor Truck Problem," for distribution by its textile department. The purpose of the publication is to emphasize the importance of motor transportation to the textile and allied industries, and to direct attention to the war-time economies possible and practical by efficiency methods in the use of power vehicles.

NOBLE MOTOR TRUCK CORP.

The Nohle Motor Truck Corporation, Kendallville, Ind., has begun the manufacture of trucks in a limited way, the first two produced, 2½ tons rating, being sold to the city of Fort Wayne, Ind., for its public works department, to be used for garbage collection. The company proposes to erect a factory and engage in production on a considerable scale.

The Abbott-Downing Truck and Body Co., Concord, N. H., has appointed Zimri West, 3rd., district manager for the sale of Concord trucks in New Jersey and Eastern Pennsylvania, with headquarters at 845 Broad street, Newark, N. J.

Leave of absence has been granted E. C. Peck, for 18 years superintendent of the Cleveland, O., Twist Drill Co., to engage in war service at Washington in standardization and the production of armament, ammunition and supplies.

The Timken Roller Bearing Co., Canton, O., has appointed M. T. Lothrop, for seven years in charge of its steel and tube department, assistant factory manager.

A. S. M. E. SPRING MEETING.

The annual spring meeting of the American Society of Mechanical Engineers will be held June 4-7 at Worcester, Mass., with headquarters at the Hotel Bancroft, and professional sessions will be held at the hotel and the Worcester Polytechnic Institute. These will largely relate to questions with which engineers are now having to deal in connection with the war.

The first meeting the evening of June 4 will be at the hotel, at which the engineers will be welcomed by the mayor and the president of the Chamber of Commerce. There will also be a reception and musical program, followed by dancing at the Worcester Museum. June 5 the professional sessions will take place at the Worcester Polytechnic Institute, with a general war session in the evening at the hotel. June 6 the closing professional session will take place at the institute, followed by a visit to the Norton company's plant, with dinner, a lecture and dancing at the Worcester Country Club. June 7 there will be an automobile trip to the Camp Devens cantonment via the Clinton Dam, lunch at Camp Devens, a visit to Concord and Lexington and return to Worcester via the Wayside Inn at Sudbury. The majority of the papers will be presented by New England members.

KISSEL TRUCK CONTRACT.

A contract for constructing trucks that will aggregate approximately \$7,500,000 in value has been made with the Kissel Motor Car Co., Hartford, Wis., through the Four Wheel Drive Auto Co., Clintonville, Wis. These trucks will be F-W-D type and the construction has been licensed by the Four Wheel Drive Auto Co., which has contracts that are said to be valued at more than \$40,000,000.

SHEPLER'S OFFICE CHANGED.

The office of Maj. Harry Shepler, who is in charge of production for the aviation section of the Signal Corps, U. S. A., has been moved from Washington to Cleveland, O., where Maj. Shepler is to direct supervision of production. He was vice president of the Willys-Overland Co., Toledo, O., until he entered the service.

POWERS SALES MANAGER.

The Chicago Bethlehem Sales Co., agent for Bethlehem trucks, has appointed Charles M. Powers, formerly with the General Motors Truck Co.'s Chicago branch, district sales manager for Illinois and Indiana. Alvert S. Oswald, Jr., has been named by the same concern as district sales manager for Southern Wisconsin and Southwestern Michigan.

Walter S. Franklin has been elected secretary of the Parrett Tractor Co., Chicago, succeeding Warren Barbour. Mr. Franklin was connected with the New York Telephone Co. for 14 years.

New Pneumatic Tire and Rim Sizes

New standard sizes for pneumatic tires and rims have been determined at a conference of directors of the National Automobile Chamber of Commerce and the War Service Committee of the Rubber Industry, held at New York. Col. Charles Clifton, president; Hugh Chalmers, Roy D. Chapin, Carlton H. Pelton, C. C. Hanch, H. H. Rice, John N. Willys, Windsor T. White, R. E. Olds, C. W. Churchill, J. Walter Drake, W. E. Metzger, John H. Dodge and Emlen H. Hare, representing the Pierce-Arrow, Chalmers, Hudson, Maxwell, Studebaker, General Motors, Willys-Overland, White, Reo, Winton, Hupp, Columbia, Dodge and Packard companies represented the automobile industry, and G. M. Stadelman, chairman, and P. W. Litchfield (Goodyear), J. C. Tuttle and R. J. Firestone (Firestone), J. C. Weston (United States), W. O. Rutherford (Goodrich), E. H. Broadwell (Fisk) and Seneca J. Lewis (Pennsylvania), represented the tire manufacturers.

The meeting approved a plan for simplification and standardization tire and rim sizes and when this becomes operative the number of styles and sizes of tires produced will be decreased from about 200 to 28, which will conserve facilities for manufacturing, reduce capital invested in raw materials and finished product, and afford better service to owners. There will be seven rim and nine tire sizes, adequate to equip any vehicle up to a ten-ton truck. The adoption of the standard will be recommended to all automobile manufacturers.

EQUIPPED WITH AUTOREELITE.

The trucks of the Signal Corps of the United States army are being equipped with Anderson model B-7 Autoreelite, which is a combination dirigible windshield searchlight with an automatic reel extension trouble light, so that the lamps can be used at any part of the machine for inspection purposes.

LONG HAUL ORE FREIGHTING.

The International Mining Co., which operates silver mines in Mexico not far from the Rio Grande river, is preparing to operate a truck service between Boquillas in Mexico and Marathon, a station of the Southern Pacific Railroad, 90 miles. The ore will be shipped from Marathon to a smelting works, probably at El Paso.

The Lavine Gear Co., Racine, Wis., manufacturer of steering gears for trucks and tractors and cars and other automobile parts, has purchased a property at Milwaukee, where it is to build a plant that will cost \$400,000. Several Milwaukee capitalists have become interested in the company.

San Francisco Has First Municipal Bus Service

San Francisco as a municipality operates a street railway system that has 45 miles of track that cost the citizens, including extensions, approximately \$6,000,000. To afford transportation to the Richmond and Sunset districts, north and south of Golden Gate Park, which are not served by the railroad, the city has established the first municipal-owned power bus service in America, which is operated as a part of the system.

There were numerous reasons for using buses, the principal one being economy. Extension of tracks would necessitate street and overhead construction, perhaps increase of power house equipment, additional cars and the operation of the lines to normal capacity of passengers without regard to the numbers carried. Besides this, restrictions prevent the extension of car lines into Golden Gate Park. Buses were decided on because these can be driven through the park, the service can be made as elastic as is necessary, and in the event of need can be diverted from one route to another.

One route is from the end of the "A" division, from 10th avenue and Fulton street, across Golden Gate Park to 25th avenue and Kirkham street, and the other from the terminus of the line at 48th avenue and Kirkham street to Cabrillo street. The buses are operated to a 10-minute headway. The machines were built by the White company for operation by one man, conductors from the municipal system driving and collecting the fares. Each bus seats 18 passengers. Seats for two passengers are at either side of center aisles in the bodies and a full width seat the rear end. Sanitary straps from the roof are at either side of the aisles.

The interiors are lighted by electric dome lamps and there are step lights at the entrances that the drivers operate by cranks located at their seat. The roof route signs are lighted by electric lamps. Hand-operated electric gongs are on the roof and push button stop signals are at each seat. The chassis and bodies are painted dark gray to conform to the color of the municipal trollies.



Fleet of Five White Omnibuses, Seating 18 Passengers, Operated in San Francisco's Municipal Service.

Five buses are now in service. The first five days three were used and these were driven 726, 669 and 576 miles respectively, averages of 145.6, 133.8 and 115.2 miles. If the work of each is continued on averages for 335 days, which allows a full month a year for repairs and overhaul, the buses would be driven 48,776, 44,823 and 38,592, or approximately from two to three times the mileage that would be driven in normal commercial or industrial service.

PIKE TO SELL PAIGE TRUCKS.

Charles S. Pike has been appointed sales manager of the new truck division of the Paige-Detroit Motor Car Co., this being an advancement from directing the promotion of passenger car sales. a



Charles S. Pike, Sales Manager, Truck Division, Paige-Detroit Motor Car Co.

department that was created about two years since, to which he was called from an association with the Burroughs Adding Machine Co. Before that connection he was engaged with different advertising and selling organizations, among which was the advertising department of the Outlook, a magazine known the world over.

Under his direction a school for Paige car salesmen was organized and extremely successful results were obtained. Recently Mr. Pike was in Washington di-

recting work undertaken for the government by the Paige company. He is now organizing a department for selling Paige trucks, which is expected to distribute machines nationally. The Paige series of trucks will consist of units with load ratings from one to five tons. The company has made a very careful preparation for manufacturing, has added new buildings and equipment and is to engage in the industry in a large way, which, however, will be entirely separate from the passenger car department.

WILL REPEAT INITIAL TRIP.

Starting from Buffalo May 28 a Pierce-Arrow truck, which is known as No. 1, will be driven to Boston and return by Harry Ward, truck sales manager for the Pierce-Arrow Sales Co., Buffalo, who made a similar trip with the machine in 1911, or seven years ago. This was the first worm-driven Pierce-Arrow truck built and it was driven from the factory to Boston via New York City, New Haven, Hartford, Springfield and Worcester. From New York to Boston, 240 miles, the truck consumed 55½ gallons of gasoline, an average of 4.7 miles to the gallon, and no adjustment was made.

After the return the truck was sold to the International Brewing Co. of Buffalo, and since then has been worked practically daily, having but one overhaul, although it has been driven more than 100,000 miles. The drive has been arranged by George M. Graham, chairman of the National Motor Truck Committee of the National Automobile Chamber of Commerce, assistant commercial manager for the Pierce-Arrow Motor Car Co. The truck will be exhibited in practically all cities en route, and in Boston, as an evidence of the endurance of Pierce-Arrow design and construction.

A. S. M. E. ANNUAL PAPERS.

Secretary Calvin W. Rice of the American Society of Mechanical Engineers has sent notice to the 9000 members of the organization stating that the annual meeting papers for presentation in December, 1918, should be in his hands Sept. 20, and soliciting papers for this and any meetings of the 22 local sections. Contributions are requested on subjects of general interest for these meetings and for the journal published by the society.

Two new buildings have been completed at the plant of the Service Motor Truck Co., Wabash, Ind., which will afford production increase to 20 trucks a day. Other expansion is planned which will make possible a daily output of 50 trucks daily.

With capital of \$275,000 the Steering Gear and Parts Co. has been incorporated at Detroit, the principal stockholders being Harry S. Hall, H. B. Lewis and J. J. Ramsay.



He must know his bearings—

else the hazard of his landing may ruin a successful flight. As he knows such bearings, so too, must he know those in his mount—as to strength and certainty of performance.

For where excess strain or exceptional loads must be handled without warning—nothing but a product proven in service equally as gruelling will do.

Hess-Bright Ball Bearings have a reputation to sustain. And it is built on the same performance that upholds it. Hess-Brights will do their work well—in your service on car or truck—where the strain and stress is petty compared to the limit they are able to stand. By the manner of their making they cannot fail.

THE HESS-BRIGHT MANUFACTURING COMPANY
Philadelphia, Pa.

Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

NEW JERSEY ONLY HAS MILITARY ROADS PLAN

"MILITARY ROADS" are ordinarily supposed to mean roads like those of France, which Napoleon and other French strategists built a century ago, as means of defensive mobilization of troops and supplies. In that old and narrow sense of the phrase we have no military roads, certainly none whose location was governed by military consideration with a view to defense against a landing of hostile troops on our shores.

But warfare has changed and many of our American highways have become military roads in the strictest sense. The most expert judgment on this point is rendered by General Goethals of Panama Canal fame. Prior to our entrance into the war he was acting as state engineer of New Jersey, from which position he resigned to become Army Quartermaster General with direction of transportation. Before leaving New Jersey he submitted a remarkable report to the State Highway Commission, recommending that it concentrate all its available funds this year on New Jersey's military roads. He listed 14 such routes, which, if properly and uniformly developed and made acceptable for heavy army and civil motor truck traffic, would have great military value in facilitating truck transportation on a large scale and relieving the railroad congestion in hauling supplies to the camps, shipping bases and quartermasters' depots.

New Jersey to Build for War.

All his recommendations were promptly accepted and the first year's levy of a direct tax which, it is estimated will total \$15,000,000 in five years, will be spent in strengthening the weak links in the roads which he singles out as of pressing military importance.

Four of the routes connect industrial regions with New York harbor, while other routes are designed at the same time to relieve pressure on New York by facilitating use of other hitherto neglected shipping points. The quartermaster's depots in Philadelphia, the great shipbuilding plants near Newark, and the war manufacturing centers that are dotted all over the northern end of the state are taken into consideration. Better roads are also called for to the forts at Sandy Hook, the naval station at Cape May and the National Army cantonments at Camp Dix and Camp Merritt. He pointed out that the only two approaches to the Hudson river were already overburdened with traffic and suggested as regrading of the Palisades highway so that the steepest grade will be seven per cent. instead of the present 16 per cent.

Goethals' Report a Masterpiece.

Altogether the report is a masterpiece by a competent army officer who fully comprehended modern industrial and economic strategy, the great new feature of this war which makes it a contest of nations and industries as well as

of armies. While no other state has made so comprehensive and expert a survey of the military feature of their road systems, there is evidence that other jurisdictions are alive to the situation and doing their loyal bit on a generous scale. The Goodrich touring bureau estimates that America will spend \$263,096,610 on roads in 1918, which is 82 per cent. more than in the biggest previous year.

Oregon will spend five times as much as last year. It goes for trunk lines into large timber tracts from which must come the timber for aeroplanes and wooden ships. Arkansas has raised its appropriation from \$4,000,000 to \$12,000,000. Texas and Oklahoma are making high expenditures, the effect of which will be to facilitate activities in great oil and farming regions. Iowa spent \$15,000,000 last year and will do it again, extending or improving 6000 miles of highway. Wisconsin is developing a trunk system of roads tapping every town. In the northeastern states a new feature of importance is the methodical use of snow plows to keep the main industrial routes passable the year round for motor trucks. New York has just appropriated \$1,000,000 specifically for improving the route from Buffalo to New York City, for inadequate maintenance and lack of snow plow work had impeded army motor transports from the West.

Conditions Not Uniformly Met.

On the other hand, the importance of the subject has not been uniformly appreciated everywhere and there are numerous sections, particularly in the industrial regions, where the national government is being seriously embarrassed by inability to do heavy motor trucking as a means of getting past railroad congestion. The great movement of army trucks for foreign service on their own wheels from Detroit to the seaboard, for example, proved impracticable except by jumping in and making wholesale repairs and improvements at defective points on the route.

One impassable mile, one neglectful community along the road, is enough to keep a great artery out of use for our military and industrial mobilization. Every state and county ought to survey its situation from this angle and do its bit. Actual motor truck traffic is no criterion of a road's possible usefulness. The stream of trucks may be going a longer route at great cost and delay because a shorter route is in disrepair. Or goods may be going by railroad that could easily be carried on the highways if some backward township were not saving money and suspending road work "on account of the war!" Many a community is buying its quota of Liberty Bonds and at the same time ignorantly embarrassing valuable lines of communication, as effectively as if it had allowed the Kaiser's aeroplanes to demonish the roadways with bombs.

The Goethals report (obtainable from the State Highway Commission at Trenton) contains enough explanation of various reasons for identifying certain roads as of military importance to furnish a fairly satisfactory guide to road authorities anywhere. Among the questions which the road commissioners of any jurisdiction should consider, are:

One—Service to army camps.

Two—Service to war plants and to open up sources of raw material such as lumber.

GENERAL ELECTRIC BUYS BIJUR.

The Bijur Motor Lighting Co., Jersey City, N. J., is to be controlled by General Electric Co. interests, which have advanced \$300,000 capital and will supply \$200,000 more as it is needed, which investment will be secured by an issue of preferred stock to a value of \$500,000. The company will be directed by Joseph Bijur and it will continue production on a large scale. The transfer of the assets of the old company to the new has been authorized by the United States District Court. Last January because of the lack of capital, there being a very great demand for its products, the company petitioned for the appointment of a receiver to conserve its assets. Under the plan of reorganization the holders of original preferred stock will be issued second preferred stock. The financial administration of the company will be directed by the representatives of the General Electric Co. on the board of directors.

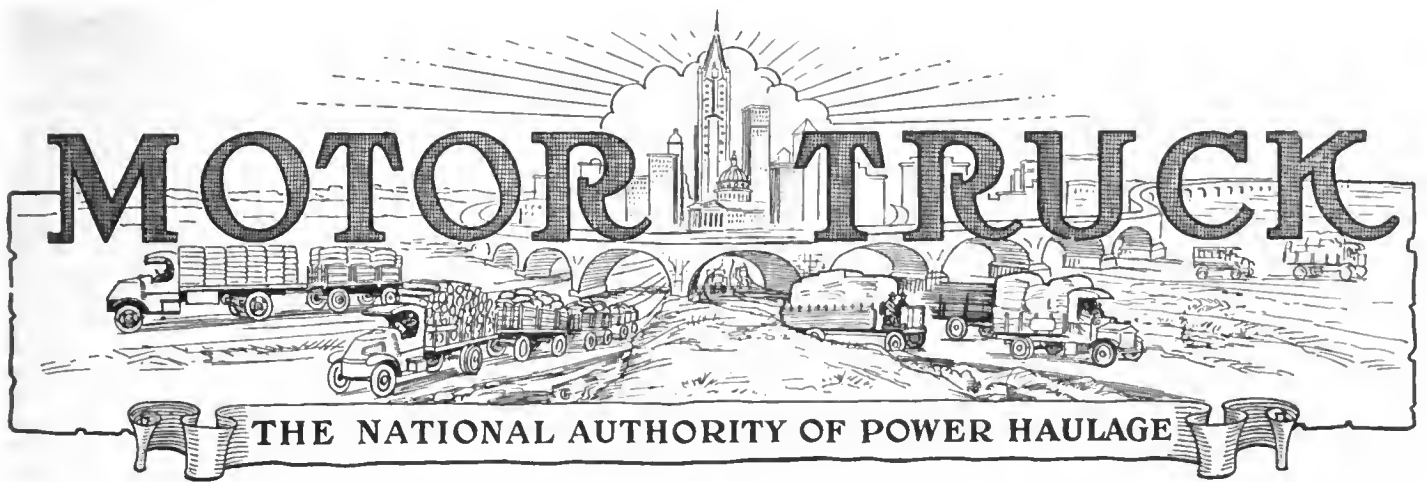
NO NIGHT WORK AT ST. LOUIS.

Beginning June 1 the garages of St. Louis, Mo., will abandon for the duration of the war night and Sunday service, which will release a considerable number of mechanics for other work, this having been agreed upon by the St. Louis Automobile Manufacturers' and Dealers' Association. Four service stations will be established in the city by the Henry Motor Service Co., which will not make extensive repairs, but will do minor repairing and adjusting, which will be reported to the service stations which would ordinarily do the work the next morning following.

BURCH JOINS CLYDE CARS CO.

A. C. Burch, for a considerable period president of the Signal Motor Truck Co., Detroit, has resigned his connection with that company and has associated himself with the Clyde Cars Co., Clyde, O., builder of Clydesdale trucks, as vice president in charge of sales and director.

A contract for truck trailers amounting to \$20,000 for the equipment of a circus is being filled by the Highway Trailer Co., Edgerton, Wis., this being necessary from the prohibition of the transportation of circuses and similar shows by railroad during the period of the war.



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PAWTUCKET, R. I.

JUNE, 1918

TRUCK DELIVERY AT ACTUAL COST

James C. Goff Co., Only Rhode Island Dealer in Masons' Materials Operating a Fleet of Power Trucks, Sells Stock at Yard Prices, Buyers Paying for Haulage on Basis of Vehicle Time and Labor and Distributes in Large Area

OPERATING its business with a delivery service practically independent, the policy of the James C. Goff Co., dealer in masons' materials, Providence, R. I., is unique in that its customers pay charges for haulage that are based on the cost of each work. The buyer is quoted yard prices and stock can be handled in what may be the most economical manner—either shipped by railroad, hauled by the buyer, by any one engaged in trucking, or the company will deliver it. The service is paid for by the buyers, who are charged for the time of the delivery units loading, going, unloading and returning. They know that time and labor are necessary for loading and unloading, and that so far as is practical no time is lost on the road.

The delivery cost quoted covers generally the time of trucks and the labor of loading and unloading, both of which can be very closely estimated. As the service is not operated for profit in the same sense that a haulage contractor would operate the figures named are as low as the work can be practically done. If time or labor can be economized the company protects itself, but if either are lost the

charge to the buyer is not increased. Primarily the object of the company is to make delivery at the lowest charge that is practical.

The James C. Goff Co. is the largest concern in its trade in Rhode Island and perhaps in southern New England. While it makes retail sales the greater part of its business is with contractors who buy in considerable volume as a

not in a broad sense competitors, but none has as many trucks or has used them for so long a period.

General Builders' Supply Trade.

The business operated was established 90 years ago by Seth Adams, and has been successively Adams & Hall, George W. Hall & Co. and James C. Goff. For 53 years the yard was at South Water and Planet streets, and 33 years ago was

removed to 31-49 Point street. The company deals in brick, lime, cement, tile, earthen pipe, heavy builders' hardware (manhole fittings, metal doors and gates and other iron or steel construction use in building), metal lath, asbestos shingles and a great variety of material, but handles no wood except lath. The company might be regarded as a wholesaler from the fact that it deals in large volumes of stock in single transactions, for frequently contractors erecting structure of consid-



Packard 5 1/2-Ton Truck in Brick Storage Shed in James C. Goff Co.'s Yard, Where in Loading or Unloading Material Must Be Handled and Stacked or Packed, This Compelling a Large Ratio of Idle Truck Time.

rule, and often in large quantities. It is not the only operator in this trade, for it has numerous competitors, but it is the only company engaging exclusively in the sale of masons' materials that uses power trucks for delivery. Other firms operating machines sell lumber and other construction material and are

erable size will place orders for delivery that will extend over considerable periods and one sale may represent a large amount.

Building operations are normally active about eight months of the year, from April to December, the other four months being emergency work or where

construction is not generally exposed to thawing and freezing. Work is varied with conditions, but usually contractors prefer continuous delivery rather than quickly filled orders, which obviates protecting material from storms, and there is less need of capital if payments are extended over a period than made in a comparatively short time.

The Goff company's yard is on the Providence river and in it is a slip where a large vessel may be docked. Two or perhaps three vessels may be unloaded at the same time. A large part of the stock is received by water and transferred from barges, sailing or steam craft direct to storage sheds, this condition minimizing the labor incidental to handling. The remainder is received by railroad on a spur track a short distance from the yard, but this must be hauled by vehicles, necessitating two additional handlings as compared with water transportation. Masons' materials mount rapidly in tonnage and vehicle loads are comparatively small in bulk, although in some instances this does not apply.

All Prices for Yard Delivery.

The stock is sold in the yard. The

distance distribution could not be systematically undertaken because animals cannot be driven continuously in hard work more than 16 to 20 miles a day unless given regular rest and reserve teams are used. While much stock was hauled from the yard by buyers, two two-horse carts and four single horse wagons were used by the company. The rail shipments were sent to all parts of Rhode Island and southeastern New England, deliveries of these being subject to whatever delays were incident to freight traffic, and the facilities for handling at the destinations. The company purchased its first power truck, a Packard, and did not reduce its horse equipment. There was expectation of increasing the distance that delivery could be made direct from the yard with minimized handling and the least loss of time by the contractors. The truck was purely an experiment, for there was no knowledge of operating cost and charges, for work could only be based on estimates until more accurate information was obtained.

Factors of Power Truck Haulage.

There were several reasons why the company believed that extended deliv-

earthen pipe and tile, all of which may be damaged by breakage or chipping, while cement or lime in bags or barrels cannot be loaded or unloaded by gravity. Pressed brick, for instance, must be taken from stacks for loading and packed with straw between the tiers in the carts or trucks to prevent chipping, and it must be unloaded and stacked with equal care, each piece being handled separately. All brick is stacked when unloaded from vessels at the yard, and must be hand handled and packed when loaded on the carts or trucks, but the cheaper grades, such as used for interior construction, can be discharged from carts by gravity, for chipping is a matter of little consequence. Brick of these grades is usually carried in horse carts and is seldom delivered long distances, for the prices are so small that there is not sufficient value to justify any unnecessary expense.

Why Loading and Unloading Is Slow.

Earthen pipe, which is used for sewers, drains, culverts and the like, must be handled as carefully as high grade brick and packed with reference to the ends. Almost as much care must be given to tile, but this can be stacked without regard for the ends. Cement and lime in bags and barrels cannot be loaded or unloaded quickly. The pipe and tile make bulky loads that will have comparatively light weight, but the cement and lime and brick and heavy hardware will require relatively small space. No matter how quick or experienced a workman may be considerable time will be taken in loading or unloading the material that must be handled piece by piece, and when straw packing is used even more time is necessary.

The situation is this, that the buyer is entitled to and expects the material delivered to him with the least damage consistent with handling and haulage, and as breakage must be made good by the company there is every reason why care should be taken. If the buyer does his own haulage he is entirely responsible and takes whatever loss may be entailed by negligence, but if the company makes delivery it must protect itself so far as possible.

No Saving in Labor Practical.

In the use made of the truck during the first year the experience was that no actual gain could be made in loading or unloading unless the number of workers was increased. The carts were worked with a driver and a helper and similar crews were used for the truck, but while loading might be done faster at the yard there was no gain in unloading, unless the buyer, understanding that he was paying for the time of the machine, was willing to work his men with the crew. Various experiments were made, but nothing was developed that was productive of vehicle time economy aside from increasing the number of men while loading. There was a decided gain in moving time, however, and, of course, the orders could be sent distances with the truck that were impracticable with animals.

The first truck was worked practically on what would be long hauls for the an-



Backing a Truck into an Alley in a Storage Shed with a Load of Brick, Where Gravity Discharge Is Not Possible and Labor Cost Is Large.

buyer may remove it with the most economical means obtainable. Comparatively few building contractors operate haulage equipment, because they do not have constant use for it, and maintenance is more and more costly. Those owning vehicles seldom have them in sufficient numbers to do any large work. If haulage contractors are engaged the prevailing prices for incidental or casual work must be paid. Where the building operations are within comparatively short distances shipments until recently were generally made by railroad, because animal haulage was very costly and often impossible. But to the railroad freights at short haul rates were added the cost of loading at the yard and hauling to and loading on the cars, with unloading from the cars to the carts and hauling and unloading at the work, unless the car can be delivered where the material is to be used.

Until 1911 as many of the large shipments as could be handled economically were delivered by rail. Within a radius of eight miles deliveries were made by horse carts and wagons. Beyond that

every would be more satisfactory to buyers. First of all deliveries could be made in every instance within a work day's time, including loading and unloading, which meant one factor of saving. Another was that making delivery with the company's equipment insured the buyers against loss or breakage in transit and handling. A third was that the prices for delivery were not in competition with the railroad, but were based on the cost of the work so far as it was known, and a fourth was that the prices would be as low or even lower than would be paid for incidental or casual hauling. Quite as much as any other factor was the fact that buyers could depend upon the service and there would be minimized retardation of building so far as this would be influenced by delivery of materials.

There was no reason to believe that there would be any decrease in the cost of the labor or handling, and there was equal certainty that the truck would be idle while being loaded or unloaded. Practically all masons' materials must be hand handled. This applies to brick,

mal teams and the shortest rail shipments and so the mileage ranged from 25 to 60 a day as an average. Careful record was kept of the work done with it and compared with horse delivery and rail shipping, and the operating cost was kept with the idea of learning what charges should be made for delivery on the basis of actual expense for use of the machine. Obviously there were limitations to the uses that might be made of the truck, but this was also true of the animal vehicles, and where there was need of quick delivery the value of the service to builders was a material asset.

First Cost of Truck Operation.

By the end of the first year the cost record was found to approximate \$12.50

that could be made by railroad without retardation of building operations in the event of delay were continued, but because of the increasing uncertainty of car shipments many contractors were willing to pay the difference in price for immediate delivery. The first winter when building operations were generally suspended because of severe weather the company contracted to do haulage for other concerns and kept its machine working for others when it was not needed for its own purposes.

In the spring of 1914 the company purchased its third truck, which was its second Packard, and there was sufficient business received beyond the horse zone to keep this busy. The policies established were followed with reference to

delivery was understood in a general way, but was best realized after the beginning of the European war, when the increase of traffic on railroads greatly retarded local freight shipments. Cars became more and more difficult to obtain and in many instances building operations were pressed with great haste. There was practically no delays at first in water freights, although prices advanced. Then the trucks could make deliveries in a few hours that would require days at the least, and often weeks.

Beginning in 1916 the first three trucks were sold and replaced with new worm driven Packards, and last year two others were added, the company now operating two of 7000 pounds load capacity, two of 8000 pounds and one of 11,000 pounds. There has been no diminution of the number of horse units, however. For the first three years the company stored its trucks in a building in the yard constructed for other purposes, but in 1914 it erected a fireproof brick garage in Richmond street, a short distance from the yard, which has capacity for 12 machines, and in a part of which the carts and wagons are kept. The garage has every facility, wash stands, steam heat, store room, work shop and a full equipment of hand tools.

Operating Zone with Trucks.

The delivery service may be said in one way to be whatever a building contractor desires. The company has made deliveries at Narragansett Pier, 35 miles;



One of the Four-Ton Packard Trucks of the James C. Goff Co.'s Fleet, Used for Quick Delivery to Contractors of Building Material in 25-Mile Radius.

a day where the mileage did not exceed 50, this being based on depreciating the machine entirely in four years at the rate of 25 per cent. of its value annually. This was generally a cost of 25 cents a mile, and the service of the truck was based on this, time, of course, being valued quite as much as any other factor of expense. There was no desire to establish delivery changes that would be regarded as excessive, because of obvious business reasons, but there was also good reason to insure against loss.

In 1912 the second truck was bought, this being another make, and like the first was chain driven. The horse equipment was not reduced, but there was ample work for this and, as with the first truck, the requirements of contractors beyond what might be established as a horse vehicle zone, kept this machine busy. The delivery charges were based on the experience with the first machine. In long distance delivery, as haulage into sections where other concerns might operate, there was no disposition to compete with them on the basis of price. The Goff company, being a large operator and dealing in many materials that were not obtainable elsewhere, found demand for stock and its prices were based on yard delivery with truck cost added.

Dependable Delivery a Large Factor.

This policy established the prestige of the company for service that was not afforded by other concerns. Shipments



Largest Packard Unit of the Goff Co.'s Equipment, with Body Designed for Handling Either Light, Bulky Loads or Heavy Compact Freights—A Type Proven to Be Best Adapted for the Service.

deliveries and as the experience increased excellent economies were obtained in vehicle maintenance. Although the trucks were depreciated on a basis of four years instead of miles driven, careful attention was given to inspection and adjustment and repair. For instance, all the trucks were chain driven and two sets of driving chains were supplied for each machine, these being alternated at short intervals and carefully cleaned to minimize wear and the consumption of fuel and lubricant. The results more than justified the expense and the work of changing. The adjustments were made at the Packard service station, as were practically all of the repairs.

The value of the trucks for highway

to Woonsocket, 16 miles; to Bristol, 16 miles; to Attleboro, 12 miles; to Greene, 22 miles; to Wickford, 25 miles, but generally its operating zone may be placed at 15 miles. The charge for service is based on miles driven and of course the longest hauls are to meet emergencies of contractors who are pressed for time and regard expense as secondary.

The operating plan of President Kelly is to have available one more truck than there is ordinarily need of, with the object of having a sufficient reserve to meet any reasonable demand for emergency service and as protection against accident that might cause withdrawal of a machine for a varying period. The trucks are used for all long hauls, and in

the event of there being no long haul work are worked on short hauls. During the winter months the trucks are used in outside haulage contracts and occasionally some really long distance trucking is engaged in. For such work a charge that will afford the company a profit is made. Since the railroads have become more and more congested and railroad shipping has become more and more uncertain there has been very little time when the machines have been worked where animal vehicles were practical, and during winter months there has been contract haulage in excess of the capacity of the trucks.

Delivery Costs Are Increased.

As prices for labor and materials and supplies have increased steadily since 1914 the operating expense of the trucks has correspondingly increased, and prices for delivery have necessarily kept pace with the advance. But this has not influenced demand and there is today all the work that can be done with the trucks. As a matter of fact railroad shipments were never so uncertain so far as time of delivery is concerned as now, and there is reason to believe that this condition will continue to increase. The trucks are more and more necessary and the dependence of contractors upon them is very large.

The company recently began to operate the standard cost accounting system that has been advocated very generally by the Packard Motor Car Co., and this will no doubt establish more definitely than ever before the expense of the trucks for delivery. The method of fixing delivery cost has been reasonably satisfactory, but it has not been absolutely accurate. The mileage charge for delivering is, however, the best and most satisfactory plan that has been found by the company.

Equipment Is Well Kept.

The policy of the company is to maintain the trucks to a high standard. The first three trucks had not reached the limitations of serviceability when disposed of, but there was belief that more economy could be realized with worm driven types and with machines that had undoubtedly been improved as compared with earlier constructions. The trucks

are systematically overhauled by the man in charge of the garage, who was the first truck driver employed, and who has mechanical knowledge and experience in this work. Considering the work the machines are extremely well kept and their appearance is exceptionally good. All are equipped with large platform bodies of the type illustrated, and these are built specially and designed for the handling of heavy material and for light, bulky loads as well.

President Kelly of the company is extremely interested in power truck haulage and gives a great deal of his time to the operation of the equipment. No doubt much of the efficiency obtained is due to the study he has made of the work and of methods that will produce economies. He has been treasurer of the Rhode Island Truck Owners' Association, an organization that has sought to obtain reasonable state legislation and to protect the interests of truck owners generally, since it was organized, and has been prominent in all of its activities. He is also president of the New England Building Supply Dealers' Association, and has also been active in promoting the general operations of members in various channels. He has developed his own service to meet the needs of his business, and the measure of his success is large when contrasted with the use of trucks by other concerns engaged in the trade.

NEW KEARNS 1½-TON TRUCK.

The Kearns Motors Co., Beavertown, Pa., which has produced a 1000-pound truck for about 10 years, is to begin production of a 3000-pound truck chassis. This machine will have a Herschell-Spillman engine and it will be driven by a Russel internal gear rear axle. The other construction units will be standard types. The selling price will be about \$1800 fully equipped.

Agencies for the sale of Selden trucks have been made with Wood & Wood, San Francisco, and the Wright Motor Car Co., Los Angeles, Cal., and the Rochester Motor Co., Spokane, Wash.

DECOU PRODUCTION MANAGER FOR ROSS GEAR.

J. W. DeCou, one of the best known men of the automotive industry, who was for eight years factory manager for the Thomas B. Jeffery Co., Kenosha, Wis., and for two years served in a similar capacity with the Smith Form-A-Truck Co., is now factory manager for the Ross Gear and Tool Co., Lafayette, Ind., which association was begun April 1. Mr. DeCou is recognized as a very efficient production man, having been very successful in increasing the outputs of the Jeffery and Smith companies, and since his connection with the Ross company has brought the capacity up considerably, affording greater foundation for the Ross claim that its equipment predominate on power trucks. The Ross plant is now turning out 6000 truck steering gears a month, more than half of which are installed in machines intended for army service.

MARTIN PATENT LICENSES.

Licenses have been granted by the Martin Rocking Fifth Wheel Co., Springfield, Mass., which controls patents for tractors with semi-trailer combinations and fifth wheels, to the Watson Wagon Co., Canastota, N. Y.; King Trailer Co., Ann Arbor, Mich.; the Highway Trailer Co., Edgerton, Wis., and the United Motor Truck Co., Grand Rapids, Mich. The licenses are granted under broad patent covering the "truck and semi-trailer with rocking connection," but with the exception of that to the United Motor Truck Co., do not include the patents covering the quick attaching and detaching device nor the spring shock absorbing device.

A manufacturing plant at Beard avenue and the Michigan Central railroad tracks in Detroit has been leased by the Power Truck and Tractor Co. of that city for six years, and production is shortly expected.

An agency for Acason trucks has been made with the American Motor Car Co., Fall River, Mass.



More Than 200 Mack Trucks Lined for Inspection Before Acceptance by the Quartermaster Corps, U. S. A., Intended for Service in France When Equipped with Bodies.

DETROIT UNIVERSAL UNIT.

Deliveries of the Detroit universal truck conversion unit, built and sold by the Parkview Sales Co., Detroit, are now being made. The units are built to a standard design and are intended to convert passenger car chassis to have load capacities of from 2500 to 6000 pounds, to meet practically all haulage requirements.

Claim is made that the units, which are constructed with Russel internal gear drive axles and other parts of equally high grade, have exceptional quality, and that the converted vehicles ought to give long and satisfactory service lives. The character of the design is demonstrated by the three-ton unit, which, for instance, has a six-inch steel channel frame and the wheels are equipped with dual solid band tires. With optional lengths varying wheelbases are obtainable whenever special vehicles are necessary, and to such machines bodies of variable sizes can be adapted.

The company is said to be carefully organized, has large resources and ample facilities for production, and the sales officers have had long experience in the truck industry. Statement is made that these units will meet a very large demand for vehicles of considerable capacities.

GREGORY JOINS LANE TRUCK.

The Lane Motor Truck Co., Kalamazoo, Mich., has made Robert M. Gregory, who has been engaged in the automotive industry for 12 years, head of its purchasing department. Mr. Gregory was first associated with the Maxwell-Briscoe Co., in 1906, and since then has held responsible positions with the Chalmers Motor Co., General Motors Co., the Hnpp Motor Car Co. and the Packard Motor Car Co., being active in the purchasing and service departments of these concerns.

TEXAN HIGHWAY HAULAGE.

With capital of \$50,000 the Dallas Freight Truck Co. has been incorporated at Dallas, Tex., to operate a freight transportation service between Dallas and Tyler, a distance of about 100 miles. The company now has 15 trucks in operation and as freightage is increased the equipment will be added to.

Clydesdale and Duplex trucks will be distributed by the March Motor Truck Co., which has established itself at 125 Wisconsin street, Milwaukee, Wis., and has agencies for these trucks for that city and the surrounding territory.

Armleder trucks are now distributed in northern Louisiana by L. Elfant, Shreveport, La., who has the agency for that section of the state.

New offices and a machine shop have been occupied by the Ladish Drop Forge Co. at Cudahy, Wis.

WEBBER CARBURETOR AGENTS.

William S. DeOtt, 1397 West 37th street, Cleveland, O., and the Eagle Auto Co., 422 South Main street, Dayton, O., have been made agents for Webber carburetors, the former concern distributing in the northern part of Ohio and the latter in the southern part.

A factory branch is established at 1765 Broadway, New York City, in charge of Henry S. Jacques. Some exceedingly satisfying trials have been made with instruments by large truck agents and operators of New York, both with reference to efficiency and economy, as well as service by the factory representative.

NOBLE TRUCK PRODUCTION.

The Noble Motor Truck Corporation, Kendallville, Ind., which has been operating for about a year and selling trucks in practically a local market, has purchased a property of 10½ acres and expects to shortly erect a building having approximately 14,000 square feet of floor space, which will be equipped with facilities for producing one truck each working day. The company is also developing the design of a 7000-pound capacity truck chassis and the experimental work has well advanced. The company will remove from the present rented plant with the completion of the new building.

The central Ohio agency for Smith Form-A-Truck chassis conversion units has been contracted for by the Sackett Motor Car Co., Columbus, O., and salesrooms have been established at 165 North Fourth street, which were used by the agent previously handling these units. The agency will control distribution of Smith units in 10 Ohio counties.

The sales of the Ohio Tire Co., Mansfield, O.; the Columbiana Tire and Rubber Co., Columbiana, O., and the Car-spring Tire and Rubber Co., Jersey City, N. J., are now directed by Carl A. Henne, who was for two years sales manager of the Ohio Tire Co., Columbus, O.

REDESIGN GRANT TRUCKS.

The designs of models 10, 11, 15 and 16 truck chassis produced by the Grant Motor Car Corporation, Cleveland, O., have been modified and these machines are now being produced with Continental engines, Jacox steering gears, heavier springs, different spring mountings, changed fan bearings, Sparton fuel feed systems and Remy lighting and starting systems will be provided for all chassis. As a whole the trucks have been considerably improved. The first deliveries will be made shortly after July 1. No change will be made in the model designations. A slight change has been made in model 12 chassis in the use of a somewhat heavier front axle of the same type.

WARD SALES ORGANIZATION.

With a view of strengthening its sales organization several changes have been made by the Ward Motor Vehicle Co., Mount Vernon, N. Y. J. C. Boyers being advanced from general sales manager to general manager, Henry F. Darby, Jr., from district sales manager to general sales manager, E. A. Lightner from assistant treasurer to eastern sales manager, and L. C. Long and C. W. Peck central and western sales managers respectively.

QUINLAN A SELDEN MANAGER.

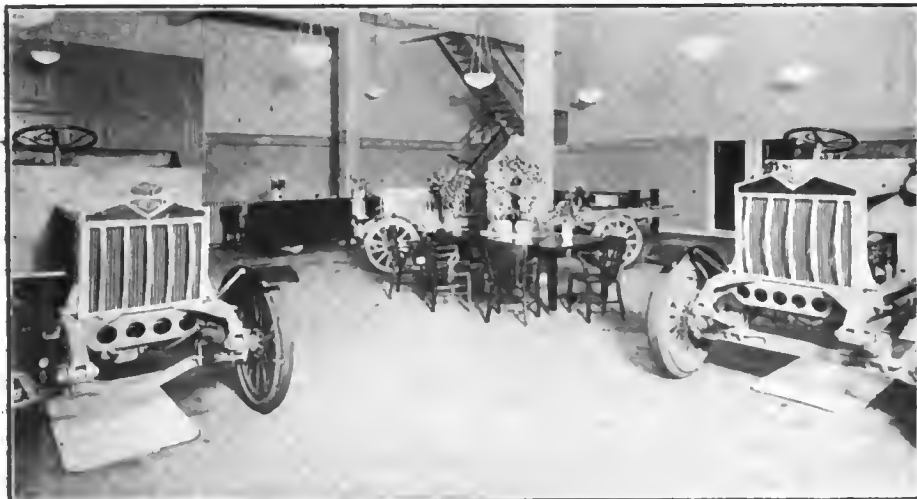
J. H. Quinlan, formerly with the Kissel agency at St. Louis, Mo., and before that zone manager for the Willys-Overland Co., has succeeded C. H. Gresslee as division sales manager for the Selden Truck Sales Co., Rochester, N. Y., with headquarters at Cincinnati, O. He will direct the sales in southern Ohio, Indiana, Kentucky and West Virginia.

J. J. Kane, Jr., formerly with the New York branch of the Kissel Motor Car Co., is manager of the sales department of the Mnrray Motor Sales Co., 823 North Broad street, Philadelphia, Pa., agent for G. A. Schacht trucks, built by the G. A. Schacht Motor Truck Co., Cincinnati, O.



Power Street Flusher on a Three-Ton Denby Truck Chassis, Used by the City of Augusta, Kan., Sold by the Salt City Motor Car Co., Hutchinson, Kan.

HENDERSON IS NEW ENGLAND CLYDESDALE TRUCK AGENT



Section of the Salesroom Floor of Fred C. Henderson, Inc., New England Agent for Clydesdale and Signal Trucks, Boston, Mass.

OBTAINING representation by an established organization that intensively operates in what is recognized as one of the best truck markets of the country is not usually quickly accomplished. Often this requires long periods of time and patient endeavor, so the consummation of a contract by which Fred C. Henderson, Inc., became New England distributor for Clydesdale trucks was gratifying to Vice President and Director of Sales A. C. Burch of the Clyde Cars Co., Clyde, O., and at the same time was an extremely satisfactory transaction for Mr. Henderson, who had until the present month dealt exclusively in Signal trucks under the name of the Signal Motor Truck Co. of New England.

Mr. Henderson is extremely well known in all the New England states. He has developed a very substantial business, having for several years sold Signal and Atlas trucks, discontinuing the Atlas line a few months since. The Clydesdale trucks were sold in Boston and adjacent territory by Dunbar, Sanders & Nowen, Inc. The head of this concern, Mr. Dunbar, is president of the Clyde Cars Co. of New York, and his belief was that better representation could be obtained through a concern exclusively engaged in truck sales and service. Negotiations were begun which resulted in Mr. Henderson becoming financially interested in the Clyde Cars Co., as well as directing the sale of machines in Maine, New Hampshire, Vermont, Massachusetts east of Springfield and Rhode Island.

With this change, which became effective June 1, planned, the Signal Motor Truck Co. of New England was succeeded by Fred C. Henderson, Inc., and the organization was changed in whatever respects were necessary to meet the new conditions. The company has a long term lease of the building at 949 Commonwealth avenue, at Gaffney street, in

the centre of the automobile district of Boston. This is one story and basement, having 30,000 square feet of floor space, which is given over to offices, salesrooms, stock room, store room and service station, and this is operated by methods that have been successful.

The business will be directed from that office and will be practically in four departments, retail sales in Boston and the surrounding towns and cities, distribution to more than 25 agents in different sections of New England, service to Clydesdale truck owners direct, and distribution of parts and material to agents who afford similar service through their own organizations. The purpose of the company is to keep in readiness for delivery a sufficient number of each series of Clydesdale trucks to meet the demands of representatives, and parts and material that might be required by owners generally. Plans have been made by which quick delivery can be insured to



Fred C. Henderson, President, Fred C. Henderson, Inc.

all dealers and owners.

With acquisition of the Clydesdale business Mr. Henderson took over the sales organization of the former distributor, merging it with his own. The sales force is directed by Elmer Twyman, who was formerly general manager for the R. E. Taylor Corporation, and prior to that with the Velle company, who is general manager, and he is assisted by Robert J. Henderson, Mr. Henderson's son, formerly with the Beacon Motor Car Co., distributor of Peerless cars and trucks, as assistant sales manager. The salesroom salesmen are directed by John Tuttle. The wholesale sales in southern Massachusetts are in charge of former Sales Manager Anderson of the Metz company. The retail sales force consists of eight men, all of whom have been engaged in the trade for long periods and are well known. The service station is in charge of James Donovan. It is equipped for any work, having facilities and the organization to serve truck owners efficiently and well.



Part of the Service Station of Fred C. Henderson, Inc., Where a Reception Was Given to Friends and Associates, to Inaugurate the Business of the New Concern, June 1.

In taking over the Clydesdale business the Signal truck agency for New England, which has been developed to substantial proportions by Mr. Henderson, has not been relinquished, and the purpose of the company is to devote the energies of its organization equally as intensively to the sale and distribution of these machines, this dual representation being satisfactory to the Signal company.

Beginning operations as Fred C. Henderson, Inc., was made an unusual occasion the afternoon and evening of June 1, Mr. Henderson and his organization tendering a reception to business associates and friends, and from 3 o'clock until 10 several hundred visited the salesroom, including a considerable number of ladies. The apartment was handsomely decorated, there was orchestral music and dancing for those who desired this recreation, and, of course, refreshments. One of the events of the evening was a dinner for the sales organization and heads of departments, at the conclusion of which Mr. Henderson and Vice President A. C. Burch of the Clyde Cars Co. made interesting remarks, dealing, of course, with the significance of the event and the results obtainable by cooperation.

MURRAY BOSCH DIRECTOR.

The operations of the Bosch Magneto Co., which has offices at New York City, and plants at Springfield, Mass., and Plainfield, N. J., will be directed by Arthur T. Murray, who is an executive of the Bethlehem Motors Corporation, Allentown, Pa., and who has been prominently identified with the automotive industry. The company has been taken over by the government as the property of alien enemies.

ADOPT CLASS B TRUCKS.

The so-called class B truck standardized by the Quartermaster's Department of the War Department, has been adopted by the department for the uses of the army where a machine of three tons capacity is required. This is the type termed the Liberty Truck by Secretary of War Baker, and which is practically the same as trucks for industrial use having rating of 10,000 pounds load capacity.

H. J. Smith has been made sales manager of the truck department of the Terwilliger Equipment Co., agent for Winther and Koehler trucks, which has salesrooms and service station at 2013 Market street, Philadelphia, Pa.

A building of brick, steel and reinforced concrete, 150 by 275 feet, will be the main shop of the plant that the Lavine Gear Co., Kenosha, Wis., will erect at Keefe avenue and North Pierce street in that city.

S. F. Bowser & Co., Fort Wayne, Ind., has made H. J. Grosvenor, formerly factory manager, secretary of the company to succeed Albert S. Bowser, who resigned to enter army service.

HAGELSTEIN IS DISCO FACTORY MANAGER.

Max Hagelstein, a pioneer in the automotive industry, has been made factory manager for the Detroit Battery Co., and the Disco Electric Manufacturing Co., Detroit, and under his direction the operations of both concerns are expected to considerably increase. He was in charge of the experimental department for the Peerless Motor Car Co., Cleveland, O., in 1900, and was with the Garford Manufacturing Co., Elyria, O., and the Rainier Motor Car Co. in similar capacities. After this he joined the Studebaker Corporation, South Bend, Ind., and Detroit, being successively plant manager, experimental engineer, assistant chief engineer and head of the domestic and foreign service departments, during which association he devised methods for increasing production and simplifying manufacturing.



Max Hagelstein, Factory Manager, Detroit Battery and Disco Electric Manufacturing Companies.

turing. The plans of the Detroit and Disco companies are comprehensive and Mr. Hagelstein is expected to make them productive.

The solid tire department of the Boston branch of the B. F. Goodrich Rubber Co., Akron, O., has been placed in charge of H. C. Krimmel, who was for a considerable period engaged in inspecting tires for government use.

The Detroit office of the Covert Gear Co. is now in charge of G. J. Conyne during the leave of absence of Sales Manager and Chief Engineer A. A. Gloetzner, who is now engaged in army service in France.

C. A. Erickson, who was associated with Scripps-Booth Corporation, Detroit, is now general manager for the Standard Radiator Co., Springfield, N. Y.

American Trucks in Two Sizes

The American Commercial Car Co., now operating at Detroit, will build truck chassis in two sizes, 1500 and 3000 pound load capacities, and the manufacturing plans are to produce 200 of the smaller and 300 of the larger machines during the present year. The company was organized in February, 1917, to operate a general machine shop, but the opportunities for truck manufacturing were such that the company's capital was increased from \$100,000 to \$250,000 in January, 1918, and the plans for production determined after designs for the chassis had been produced and the experimental work begun.

The president of the company is Henry C. Wiedeman, vice president of the Federal State Bank of Detroit and vice president of the Pfaunder Co., Rochester, N. Y., the largest manufacturer of glass enameled steel tanks in the world; the vice president is Fred Kahl, president of the Fred Kahl Iron Foundry Co.; the secretary is George P. Good, a retired capitalist, and the treasurer is O. F. Kulwitz, vice president of the Detroit Storage Co., and a director of the Federal State Bank.

The truck chassis will be constructed of standard units. Those of the 3000-pound units will include four-cylinder Continental engines with cylinder bore of 3½ inches and stroke of five inches; Long shell type radiators, Russel internal gear drive rear axles, Timken front axles, Tuthill semi-elliptic springs, 40 inches length front and 54 inches length rear; Hayes wood artillery type wheels, Gemmer irreversible worm and gear steering gears, Goodyear tires, solid, cushion or pneumatic optional, 34 by 3½ inches front and 34 by five inches rear; Splittdorf magnetos and Gray & Davis lighting and starting systems. The wheelbase will be 140 inches. The equipment will include driver's seat, windshield, horn, combination electric and oil dash and tail lamps, tool kit and jack. This model will be known as the Wolverine.

The smaller model will be the American, and the construction units will include Golden, Belknap & Swartz engines, with cylinder bore of 3½ inches and stroke of 4½ inches; Candler radiators, drop forged I section front axles, full floating bevel gear driven rear axles, Detroit springs, 38 inches length forward and 54 inches length rear; Jacox steering gear, artillery type wood wheels, Goodyear tires, 32 by 3½ inches or 33 by six inches; Connecticut ignition and Dyneto lighting and starting systems. The wheelbase will be 108 inches and the chassis weight 2250 pounds. The equipment will include windshield, curtains, electric horn, electric dash and tail lamps, tool kit, jack and extra tire rims.

The Grant-Lees Gear Co., Cleveland, O., has elected Richard Ferguson vice president.

THREE CAPACITIES OF LANE TRUCKS OF STANDARD UNITS

CLAIM is made by the Lane Motor Truck Co., Kalamazoo, Mich., that the transportation units it builds are designed for extremely economic service and that the unusually complete equipment and six-cylinder engine are

and vibration is minimized.

The starting and lighting equipment of the trucks is regarded as affording a considerable measure of time and fuel economy—in fact much more than is usually believed—for there is a saving of

both gasoline and oil whenever the stops are made, and the engines are not "idled" by drivers to avoid the labor of cranking them. Electric lights are necessary, especially when trucks are worked in interstate and intra-state services. As an indication of public opinion the introduction of a bill in the New York City Board of Aldermen to exclude from the busier commercial thoroughfares of the city trucks not equipped with en-

gine starters, is pointed to by the Lane company.

Standard Construction Units.

The construction units included in Lane trucks are all well known. Continental engines, equipped with Stromberg carburetors, Connecticut ignition, Stewart fuel feed, Pierce governors, Roth starting and lighting system and Willard storage battery; radiators built by the Lane company, Borg & Beck dry disc clutches, Kalamazoo springs, Acme universal joints, Timken rear and front axles, Ross steering gears and frames built by the Lane company are in all models; Fuller transmission gearsets, in unit with the clutch and engine, are used in model F machines, and Covert transmission gearsets designed for installation amidships are used in models B and C.

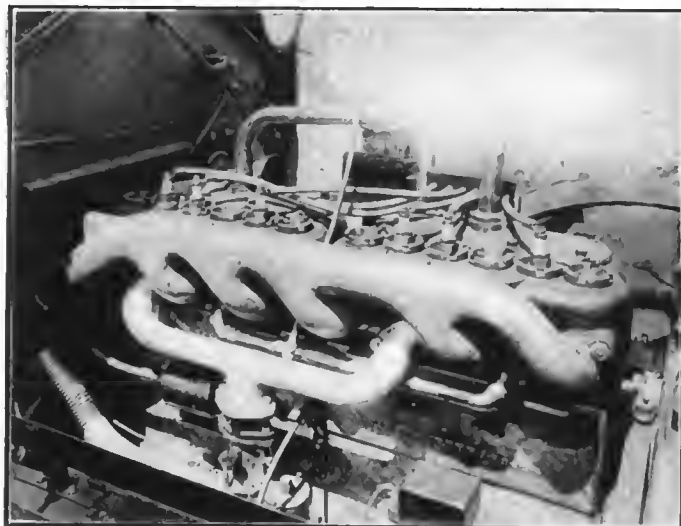
From this statement one will understand that the only variance in design is in location of the transmission gearset in the smallest truck. The model F truck has a four-cylinder engined power plant. The models B and C have six-cylinder engines with independent transmission gearsets.

The engine of the model F truck is a model N with cylinder bore of $3\frac{1}{4}$ inches and stroke of five inches, that is rated by the S. A. E. formula at 19.60 horsepower, a Continental rating of 23 horsepower at 1000 revolutions, and a maximum of 38; the model B truck six-cylinder engine has cylinder bore of $3\frac{1}{4}$ inches and $5\frac{1}{4}$ inches, with S. A. E. rating of 29.40 horsepower, a Continental rating of 31 horsepower at 1000 revolutions, and a maximum of 55 horsepower; the model C truck six-cylinder engine has cylinder bore of $3\frac{3}{4}$ inches and stroke of $5\frac{1}{4}$ inches, with an S. A. E. rating of 33.75, a Continental rating of 37.50 horsepower at 1000 revolutions, and a maximum of 52.

General Features of the Engines.

These engines are all built with the cylinders cast en bloc with water jackets integral, with large detachable water jacket heads and two-section crank cases. The engines are an L head type with the valve mechanism fully enclosed. The lubrication system is a combination, the oil being drawn from the reservoirs by pumps, and forced through ducts to the main and camshaft bearings and timing gearset, and distributed by splash to the cylinder and piston walls, wristpins, cams and valve tappets. The engines are cooled by circulations of water through the engine jackets, forced by centrifugal pumps, and the radiators are built with cores of finned tube and cast top and bottom tanks and heavy side columns, that are bolted together and mounted on the frame side members so as to be protected from the stresses of chassis distortion. Radiation is insured by fans carried on annular ball bearings on adjustable brackets on the forward ends of the engine blocks, that are driven by flat belts from pulleys on extensions of the water pump shafts.

The engines are fitted with three-journal crankshafts and camshafts, the crankshafts and connecting rods being carried in nickel babbitt bearings mount-



Lane Six-Cylinder Power Plant, Showing the Heavy Wiring and the Dash Lamps Inset Into the Casting for Protection.

qualities that appeal to business men who value dependability and utility. Statement is made that the Lane trucks were the first built with six-cylinder engines, construction being begun about a year before two other manufacturers began production of trucks with this type power plants, and that Lane units were of the first equipped with electric lighting and starting systems and with comfortable enclosed cabs adapted for work in all weather.

Lane trucks are built in three sizes to one general design from standard construction units, the object of the engineer being to obtain what will afford a large measure of operating economy, low maintenance expense, and have such endurance that service dependability is certain. The manufacturer has had long experience in power vehicle production and the machines are built to a mechanical ideal rather than to a price. The Lane trucks are model F, model B and model C, having load capacities of 3000, 5000 and 7000 pounds respectively.

Lane Trucks a Type Demanded.

The Lane company maintains that truck operators in New York City and other large commercial centres are demanding six-cylinder trucks because machines with engines of this type are more flexible, are more satisfactory in congested traffic where quick starting is essential, have greater endurance, and can be maintained for smaller expense. The claim is based on belief that the six-cylinder engine operates more smoothly at any working speed, that it is not stressed by continuous acceleration and deceleration necessary in city streets,



The Lane Model C 7000-Pound Six-Cylinder Engined Truck Chassis, with Electric Lighting and Starting System and Complete Equipment.

ed in bronze cages, adjustable with shims. The camshafts are mounted in phosphor bronze and the wristpin bores of the connecting rods are bushed with the same metal. The crankshafts and camshafts are drop forged from special alloy steel and are heat treated to obtain a high standard of strength and endurance and are accurately ground to exact dimensions.

The engines are equipped with Stromberg carburetors, Connecticut ignition systems, Stewart fuel feeds, Pierce governors, Roth two-unit lighting and starting systems in combination with Willard storage batteries, and the carburetor intakes have hot air jackets to insure temperature that will readily volatilize the fuel. The auxiliaries are so installed that there is accessibility and each installation is in itself designed to be sufficiently protected against accumulations due to water or dirt.

Power Transmission Systems.

The Borg & Beck clutches are a multiple dry disc type that have the discs faced with a high quality asbestos fabric that is not affected by heat or dust or lubricant, and require minimum attention to obtain maximum efficiency. The clutches are easy of engagement, are positive and only the bearings require lubrication at long intervals.

In the model F the transmission sliding gear gearset is combined with the clutch and engine. It has three forward speeds and the drive is by a large tubular shaft having an Acme universal joint at either end. In the larger models the drive is through clutch shafts with universal joints at the rear ends. The shafts are coupled to the main shafts of Covert selective type sliding gear gearsets, having four forward speed ratios and reverse. The shafts are large size, are nickel steel, heat treated, and are carried on roller bearings. The gears are $3\frac{1}{2}$ per cent. nickel steel, heat treated and have wide faces. The drive is by tubular shafts having Acme universal joints, well enclosed and protected, at either end of the shafts.

The rear axles are a Timken worm driven three-quarter floating type, the housing of which is cast steel in three sections, bolted together, with a heavy truss anchored at either end. The central section is a bowl, the cover of which carries the worm shaft, the worm wheel and the differential gearset, which are mounted on Timken roller bearings. The bearings are adjustable for wear. When the bolts retaining the cover of the bowl are removed the entire assembly can be hoisted out as a unit. The axle is lubricated by the worm wheel revolving in lubricant contained in the bowl, which requires attention only at long intervals, when the used oil is drained from the axle and replenished. The front axle is an I section steel drop forging with very heavy steering knuckles, fitted with Timken roller bearings for the wheel splines and the spindle pivots, the pivot bearings carrying the loads and making steering remarkably easy.

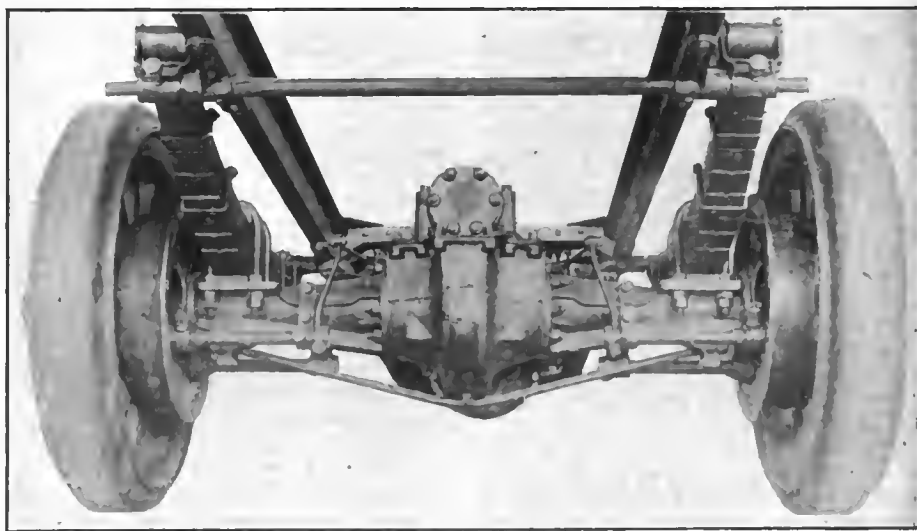
Other Chassis Details.

The frames are made by the Lane company from six-inch steel channel section

having wide webs, with cross members heavily gusseted and hot riveted. These are suspended on semi-elliptic springs, the rear set being banded at the centers and fitted to special plates through which the spring clips pass. This construction securely retains the springs in form so that there is no excessive stress upon the clips from the driving or braking thrusts, for the drive is through the springs and no radius rods are used. The alignment of the spring shackles is preserved by tie rods extending from one spring to the other across the chassis, this preventing distortion under the stresses of road shock or unequal distribution of weight upon the frame.

The wheelbase of the model F truck chassis is 144 inches, of the model B truck 150 inches and of the model C truck 160 inches, with option of 180 inches for special uses. The front tread is 62 inches and the rear tread 66 inches. The wheels are artillery type, of wood, with 14 spokes, those of model F being shod with 34 by $3\frac{1}{2}$ inch single tires forward and 34 by four inch single tires

backward and means are provided for easily reaching all parts where oiling or greasing is required, and so far as possible all wearing parts are protected against the influence of abrasives. The step hangers are extremely rigid steel forgings. The radiators are protected by three-inch steel channel bumpers. The gasoline tanks will contain 24 gallons and these are heavy steel cylinders with welded joints installed under the drivers' seats. The sides of the hoods are removable so that the engines can be reached readily whenever occasion requires. The floorboards of the drivers' cabs are very substantial and are bolted direct to the dash brackets, which are cast steel. The dash lamp lenses are inset in settings cast into the dashes and are located 40 inches above the road surface, so as to afford the largest degree of illumination and protect them against damage from striking objects. They cannot be affected by the vibrations of the machines while being driven. The tail lamp lenses are similarly inset in the rear frame members and have similar



Rear End View of a Model B Lane 5000-Pound Truck Chassis, Which Has a Timken Worm Driven Axle and Special Spring Suspension.

rear; model C with 34 by four inch single tires forward and 34 by six inch single tires rear, and model C with 36 by five inch single tires forward and 36 by five inch dual tires rear. The regular tire equipment is Goodrich De Luxe.

Steering Gear and Brakes.

The steering gear is a Ross worm and split nut construction, with fore and aft movement of the drag link, the steering columns being located at the left sides. The tie rod is behind the front axle to protect it from contact with road obstructions. The control is by foot pedals for the clutches and service brakes, ignition and throttle control levers under the steering wheels, with foot accelerators and gear shifting and emergency brake levers in the center of the footboards. The brakes are all internal expanding within large drums on the rear wheels and the shoe areas are such that there is exceptional braking capacity. These brakes are easily adjustable. The lighting and starting switches are placed conveniently for the drivers.

Much attention has been given to lu-

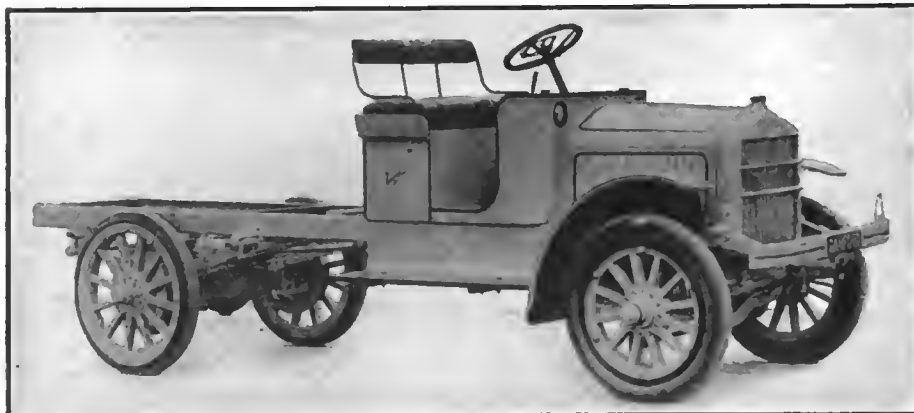
protection. The lamps are all very accessible. The cabs are complete in all details, having windshields, curtains, etc., and the seat units are constructed with sliding doors so that in winter or stormy weather the drivers' feet are protected, but when not needed the doors slide into recesses and are locked and secured against damage. The chassis are equipped with front fenders, drivers' seats, electric dash and tail lamps, electric horns, tool kits, jacks and oil cans.

THE RUSSEL MAGAZINE.

The Russel Motor Axle Co., Detroit, Mich., is publishing a neat little booklet under the title of "The Russel Magazine," which is edited by Allen C. Chambers, and is intended for distribution among truck salesmen in the interests of the internal gear drive axle. The magazine is well printed and contains some interesting facts that are presented in breezy story form, and some capital illustrations pertinent to the varying subjects dealt with.

GARFORD MODEL 75C TRUCK

IN NEW STANDARD SERIES



Model 75C Garford Truck Chassis, Load Capacity 2000 Pounds, with Full Equipment—A Much Improved Type in Standard Series.

SIMPLIFIED construction with the purpose of obtaining every desired quality that will make for accessibility and service endurance is exemplified in model 75C truck, production of which was recently begun by the Garford Motor Truck Co., Lima, O., which is rated at 2000 pounds load capacity. This machine is intended for fast delivery work, and to obtain speed with minimized vibratory stresses from road shock the machine is equipped with pneumatic tires on the forward wheels and solid tires on the rear. There is believed to be sufficient advantage to justify mixed tire equipment, this having been demonstrated by extended experiments before the decision as to tires was reached.

The chassis takes the place of the machine of the same rating in the series built by the company, and compared with the previous production it has these changes, which are uniform with the construction of the Garford 3000 and 4000 pounds trucks: Engine with cylinder bore of $3\frac{1}{2}$ inches and stroke of $5\frac{1}{2}$ inches, 128-inch wheelbase, 108-inch loading space, transmission gearset located amidships, cast tank radiator, cylindrical gasoline tank, bumper and three point rear spring shackles.

The three principal changes mechanically are in the use of the engines, which are increased in size from $3\frac{1}{2}$ inches bore and $5\frac{1}{2}$ inches stroke, the change of the transmission gearset from in unit with the engine to amidships, and the adoption of the new type spring shackles for the forward ends of the rear springs. The price of the chassis is increased from \$1750 to \$2100.

Four-Cylinder Engine a Buda.

The engine is a Buda construction, a four-cylinder, four-cycle, water cooled, L head type, with the cylinders cast en bloc with the water jackets integral, the jacket head being a large, easily detachable plate that carries the water outlet manifold. The water chambers are large and free circulation is obtained, which insures adequate cooling. The pistons are a three-ring type. The crank case is

cast in two sections, the upper carrying all main bearings, and the lower serving as a reservoir for the lubricating system. The forward and rear extensions house the timing gearset and the fly-wheel and clutch. The crankshaft is a three journal type of large size and ample bearing surface, forged from special steel and heat treated, and the camshaft is drop forged with high grade steel, with the cam integral, heat treated, with the cams formed with extreme care. Both shafts are ground to exact dimensions. The connecting rods are steel drop forged I sections.

The main and connecting rod bearings are habbitt in bronze shells, which are adjustable with shims. The camshaft bearings are phosphor bronze, and the bores of the wristpin ends of the connecting rods are bushed with phosphor bronze. The wristpins are anchored at one end in the bosses of the pistons, this allowing expansion without stresses. The timing gearset is large, the gears having wide faces to obtain endurance. The valves are fitted in long bushings, and the mushroom type valve tappets, which are fitted with adjusting screws and lock nuts, are mounted in removable bushings. The valve mechanism is enclosed by easily removed cover plates.

Cooling and Lubricating Systems.

The engine is lubricated by a circulating system, the oil being drawn through a filtering screen into a pump well by a plunger pump and forced through ducts and a sight feed gauge on the dash to the main bearings and the timing gearset, the overflow draining to the base of the crank chamber, where it is distributed to the cylinder and piston walls, the wristpins, camshaft bearings, cams and valve tappets by the splash of the big ends of the connecting rods in the oil troughs. The drainage from the troughs flows to the reservoir. The oil reservoir and the oil level indicator can be removed readily when occasion requires.

The water of the cooling system is forced through the engine jackets by a

centrifugal pump of large capacity and a radiator having a finned tube cooling section and finned cast top and bottom tanks. The radiator is very substantial and can be easily repaired in the event of damage, being assembled with a series of bolts. It is installed so as to be protected against strains from chassis distortion. The radiation is increased by a large fan carried on ball bearings on an adjustable bracket on the forward end of the cylinder block, that is driven by a flat belt from a pulley on the forward extension of the pump shaft.

Fuel and Ignition Control.

The fuel is drawn through a Rayfield carburetor from a 20-gallon cylindrical steel tank with welded joints installed under the driver's seat. The carburetor is jacketed to be heated with hot water. The fuel system includes a Monarch governor with which the speed of the truck is fixed at 18 miles an hour. The source of the ignition current is a Dixie high-tension magneto, using one wiring system and single set of spark plugs, the wiring being extremely simple. The current is controlled by a switch on the dash and a lever on the steering column. When specially ordered the engine will be equipped with a Westinghouse lighting and starting system at an additional cost of \$175.

The engine is carried in the chassis frame at three points—a trunnion support on a cross member and by brackets on the side members—this protecting it against stresses of chassis "weaving." The clutch is a Brown-Lipe dry disc type that is enclosed in a housing bolted to the engine crank case, that requires no lubrication and but little attention. Inspection and adjustment can be made through a hand hole covered by an easily removable plate. The drive from the clutch to the transmission gearset is by a short shaft having one universal joint. The transmission gearset is a Brown-Lipe selective sliding gear type, having three forward speed ratios and reverse. The gears are large size and have wide faces, and the shafts are extremely heavy. Shafts and gears are nickel steel, heat treated. The shafts are carried on Timken roller bearings. The gearset is supported between two frame cross members at three points. From the gearset the power is transmitted to the worm drive rear axle by a tubular shaft with fully enclosed universal joints at either end.

Worm Drive Rear Axle.

The rear axle has a housing of pressed steel with an enlarged central section in which the worm shaft and worm wheel and differential gearset are installed. The worm shaft, worm wheel and differential gearset are assembled in a unit with the cover plate of the central section. The differential gearset is a bevel type. The driving shafts are carried on the differential bearings at the inner ends, the wheels being driven by the outer ends. The wheels are mounted on bearings on the axle housing, these bearings taking the end thrust on the shafts. The front axle is a drop forged heat treated I section.

The frame is constructed of pressed steel

channel section, with cross members reinforced with gusset plates, that is hot riveted. The frame is carried on semi-elliptic springs, the shackles of the forward ends of the rear springs being a three-point construction having two lower supporting pivots. The eye of the master leaf of each spring is carried on the forward lower pivot and the elongated eye of the second leaf on the rear lower pivot, and the ends of the third and fourth leaves are extended to support the ends of the master and second leaves. The chassis is driven through the springs and the driving and braking stresses are taken by the reinforced ends and the shackles instead of the single spring eye. Heavy coil springs reinforce the rear main springs when these are fully loaded.

The wheelbase of the chassis is 128 inches, and the tread forward is 56 inches and the rear is 58 inches. The wheels are wood, artillery type, with S. A. E. standard rims, and are mounted on Timken roller bearings. The front wheels are shod with 34 by 4½ inch pneumatic tires and the rear wheels with 36 by four inch solid single tires. The steering gear is a Ross worm and nut irreversible type, with means for adjustment to compensate wear, at the left side of the chassis, with a large hand wheel. The chassis is controlled with foot pedals for the clutch and service brake, ignition and throttle control levers on steering wheel, foot accelerator, hand levers for gear shifting and the emergency brake located in the center of the footboard, and a magneto switch on the dash. The brakes are both internal expanding, the shoes two inches wide, operating within drums 16 inches diameter on the rear wheels. The dash is the Garford Roman type of pressed steel into which the two dash lamps are inset, this affording protection against accidental damage. The chassis is equipped with driver's seat, front fenders, running boards, oil dash and tail lamps, odometer, horn, jack, set of tools and oil can, extra demountable tire rim, tire repair outfit and tire pump.

Herman P. Schrade has resigned as president and general manager of the Bearings Co. of Philadelphia, Pa., to become president of the Chalmers Sales Corporation, eastern distributor of the Gill Piston Ring Co., New York City.

Federal Control of Highway Work

The activities of the governmental committee that was primarily authorized to control the distribution of road building and repair material, has been considerably increased, according to the United States Department of Agriculture. This committee, which is to control all government functions relating to streets and highways, is known as the United States Highways Council, and it will consist of Lieut. Col. W. D. Uhler, representing the War Department; C. G. Sheffield, representing the Fuel Administration; Richard L. Humphrey, representing the War Industries Board; G. W. Kirtley, representing the Railroad Administration, and Logan Waller Page, representing the office of public roads of the Department of Agriculture. This committee has organized with Mr. Page as chairman and J. E. Pennybacker, chief of management of the office of public roads, as secretary.

Statement is made that the council is formed primarily to prevent delays, financial loss and the uncertainty incidental to the method of taking up each highway problem in its turn with a separate and distinct government agency. The council was instituted at the suggestion of the secretary of agriculture, and through the department it will continue the close contact already established, both formally by law and informally by practice, with the state highway authorities in each state.

The council will utilize the organization of the 48 state highway departments with their trained personnel and knowledge of local conditions, and constitutes a single agency where all highway projects calling for governmental action of any character, whether it be a question of finance, of material, of transportation, or of war necessity or desirability, may be dealt with. The council has provided a definite form on which applications for relief are to be made through the respective state highway departments, and has supplied these forms to the different state officials. The council emphasizes the greatest need of conservation of money, transportation, labor and materials by restricting highway and street

work to absolute essentials. It ranks maintenance of existing streets and highways first, reconstruction of badly worn streets and highways next, and last, new construction justified only by vital war or economic necessity.

This council controls the distribution of all road materials through car supply for transportation, and all proposals for transportation must be passed upon by the council, which will make recommendation to the fuel and railroad administrations. The Council of National Defense defines roads of importance to the government to be those utilized or to be utilized by the War Department for military purposes, those carrying considerable volumes of materials and supplies essential to war industries, and those having bearing on production and distribution of food supplies.

HAUL 20-TON BRIDGE GIRDER WITH FIVE-TON TRUCK.

The haulage capacity of trucks worked as tractors, with either semi-trailers or trailers, is not generally realized. There is no general rule by which the maximum work that can be done practically can be determined, but the normal rated load that can be carried can be exceeded from three to four times.

A work done by R. R. Sprague of Dover, N. J., with a five-ton Garford truck demonstrates that more than four times the load rating can be hauled. The machine was used to haul two steel girders, 81 feet six inches long and weighing more than 20 tons each, from a freight yard to the site of a bridge building at the Rahway river at Cranford, N. J. Both from the weight and the length the girders were difficult to handle.

A two-wheeled trailer that weighed a ton carried the greater part of the load, this being placed 40 feet from one end of the girder. This end of the girder was jacked and placed on the rear of the truck platform body and chained. Loading the girders was slow because the space was limited and six-inch thick plank ways for the trailer wheels were built in the railroad yard because the ground was soft.

When the ways to the paving of the street were in readiness the truck hauled the girders about two miles in comparatively short time.



Hauling Steel Bridge Girder Weighing 20 Tons, on Two-Wheel Trailer, Using Garford Five-Ton Truck as Tractor, from Dover, N. J., to Bridge Site at Cranford, N. J.

Value to Nation of Automotive Industry

The scope of the automotive industry and its true importance among the resources of the nation is set forth in a pamphlet just issued by the National Automobile Chamber of Commerce, which is in effect a presentation of statistics that deal with totals rather than details. For instance, statement is made that the number of persons employed in the industry is \$30,000, and that they with their dependents would populate the city of Chicago, or Philadelphia, Boston and St. Louis combined, or any one of 12 states, or seven states combined.

The wages paid annually, \$747,000,000, are approximately equal to all the gold in circulation in the country. The industry uses capital valued at \$1,297,000,000, which is more by \$250,000,000 than that of all the national banks; greater than the combined capital stock of the Pennsylvania, New York Central, Chicago & Northwestern and the Chicago, Milwaukee & St. Paul railroads; is more than twice the capitalization of the group of 35 Standard Oil companies, and is four times as much as the combined capital of all steel companies save the United States Steel Corporation.

With relation to vehicle possibilities, claim is made that the number of passenger miles with automobiles is not less than 10,000,000,000 greater per year than that of the railroads of the country. The seating capacity of the automobiles in use is 25,000,000, and of railroad cars 3,500,000; that if the railroads were to handle the number of people carried in automobiles, duplication of all passenger cars and locomotives, at a cost of more than \$1,000,000,000, as well as passenger tracks, stations, employees, at incalculable expense, would be necessary.

A possibility is stated: That had an army of 1,000,000 men been mobilized in this country Oct. 1, the automobiles of the United States, traveling 100 miles each a day, with four passengers each, could have carried every man of the

army 600,000 miles up to the end of May. Another statement is that during the 16 years after beginning the use of automobiles farm values have increased three times the rate of the previous 20 years, despite the fact that the rate of increase of population, and particularly farm population, decreased during the 16 year period. Another conclusion is that assuming farmers use their cars an average of but 10 miles a day and only one passenger is carried in a car, deprivation of the cars and substitution of horses would result in an aggregate loss of time to the farmers of the country of 300,000 years in every year. Another fact stated is that were the land needed to raise food for the horses of the United States cultivated with tractors, the crops produced in one year would pay the national debt, including all Liberty bonds issued to date. Copies of the folder may be obtained by addressing the chamber at 7 East 42nd street, New York City.

TRUCK LOADS OF RABBITS.

One of the animal pests of some of the western states is the rabbit, which in some sections are extremely numerous and cause much damage to growing crops. The farmers frequently organize drives, during which areas where the animals are found are surrounded and with dogs the rabbits are driven to centers where they can be killed by shooting.

Often thousands of rabbits are killed in a single drive. In normal times the carcasses have little value, for the prices obtainable do not justify the cost of transporting them to distant markets, although the flesh is excellent food and the pelts can be sold. Rabbit fur is used for hat making and other purposes. Now, however, the carcasses are worth enough for food and fur so that a drive can be made profitable, for the time of men and animals and ammunition represents money.

During a recent drive at Caldwell, Ida., participated in by ranchers living near that town, more than 10 tons of rabbits were killed in a single day. The total numbered thousands. After the killing three Denby trucks were loaded with the

carcasses, which were taken to Caldwell where they were sold for 25 cents each. The proceeds were donated to the Red Cross. The accompanying illustration shows one of the trucks after its arrival at Caldwell.

BUDA COMPANY'S EXPANSION.

The latest addition to the plant of the Buda company, exclusive builder of truck and tractor engines, is well nigh completed, and when it is equipped with manufacturing facilities it will add materially to the production of the works. The new building is 280 by 80 feet, four stories, having 89,600 square feet of floor area, or slightly in excess of two acres. The structure is brick and reinforced concrete and has every convenience for the welfare of the workers.

This expansion was necessary to meet the production demand, despite the fact that the output of the original plant had been considerably increased by careful internal alterations and rearrangement of equipment, as well as changed methods for handling the work. The structure has been ingeniously fitted into the general manufacturing plan of the company. The company, however, with these preparations, has licensed the government to have engines made to Buda design for war purposes in such plants as may be desirable to meet government requirements.

TIMKEN-DETROIT GOLD NOTES.

To refund notes payable and fill government orders the Timken-Detroit Axle Co., Detroit, has placed seven per cent. serial gold notes to the value of \$2,000,000 through the National Cities Co., New York City, these being issued in coupon form in \$1000 each, and may be redeemed at the option of the company on any interest date upon 30 days' notice, either as a whole or in series.

TRUCK EXPORTS REDUCED.

In April, 1918, 655 trucks valued at \$1,392,125 were exported, as compared with 1039 trucks, valued at \$2,316,368 exported during the corresponding month in 1917. This was a slight gain in numbers, although the valuation was less, for 620 trucks valued at \$1,526,387 were exported in March, 1918.

COMMERCE TRUCK SHIPMENTS.

More than 100 trucks to meet government orders, principally for army service, were shipped by the Commerce Motor Car Co., Detroit, during May, a shortage of material considerably reducing the anticipated production. The present month the output has been substantially increased.

The Reo Motor Car Co., Lansing, Mich., is now making an average of 90 vehicles a day, of which about 30 are trucks. The production of tracklaying tractors to fill government orders will shortly be begun.



One of Three Denby Trucks Loaded with Rabbits Killed in a Great Drive at Caldwell, Ida., Sold for the Benefit of the Red Cross.

MAN-POWER ECONOMY FROM ONE-DELIVERY-A-DAY PLAN

Employees and Vehicles Released Average 33 Per Cent. with Non-Food and 25 Per Cent. with Food Stores, and Deliveries Shrink 40 Per Cent.—Buyers Accept Conditions Cheerfully—Cooperative Suburban Distribution Planned.

COMMERCIAL economy as comprehended by the Council of National Defense, has been promoted by its commercial Economy Board, which has since the beginning of the war with Germany conducted a very thorough and systematic campaign through all commercial and industrial organizations to so conserve man power that essential

Delivery Economy is a War Work in which every buyer can engage without sacrifice or inconvenience or expense.

war work could be carried on and the activities of normally legitimate enterprises not be so restricted that they would materially suffer.

The attention of this board has been impartially directed toward all business and industry. Executives have been urged through numerous instrumentalities to undertake economies, possibilities being pointed out that were regarded as practical to varying degrees. The basic factor has always been patriotism, that the resources of the nation might be better directed to prosecuting the war.

To a very large degree transportation economy has been urged, because the railroads were swamped with the tonnage offered them previous to the war and the requirements of the government were naturally given precedence or priority as against those of industry that were not absolutely necessary for the preparations incidental to army and navy operations or maintenance.

The congestion of the railroads and the delays of freight impelled business men to turn to highway transportation, generally operating independently because organized service was not avail-

Unnecessary delivery is a burden upon people who must make the most of every resource for national protection.

able. The volume of highway haulage has increased enormously. Prior to the war statement was made that the cost of transporting and handling food crops alone by road vehicle equaled the cost of production. No definite figures can be stated because no survey has ever been

made, but estimates have placed the total expense of transporting agricultural crops from producer to consumer as \$600,000,000. Considering the increased cost of labor and haulage in the last four years an estimate of \$1,000,000,000 for what might be regarded as marketing cost does not appear excessive.

In addition to this the cost of distribution from stores to customers has been correspondingly increased. Practically every store of considerable proportions has made delivery of goods to customers, often extending operations materially through what was regarded as service—in other words, sending goods wherever required by buyers, within definite limitations with its own equipment, and extremely long distances by mail, parcel

Delivery economy cannot be obtained unless the business men plan to bring the largest possible degree of efficiency.

post, express or freight. Free delivery, so-called, has been developed for the convenience of customers. From the viewpoint of the buyer distribution was not specifically charged for and for that reason was free. As a matter of fact prices were established on all goods to include the expense of delivery, so that while there was not a price for an article or commodity and a charge for delivering, the customer paid for the service.

There is no need of further discussing

Sacrifice of capital is not necessary with a reduction of delivery equipment by concerns operating their own services.

the system for the purpose of establishing that all buyers contributed toward the general operation and maintenance of a delivery organization and equipment. But emphasis should be made that no business concern ever expected to make a profit from its transportation department, and as a rule the belief of business executives has been and now is that distribution is a loss because no revenue is earned and expenditures in some instances reach very large figures.

The policy of large companies, especially those operating stores on large scale, either departmentized or

specialized, has been to develop service that had advantage in area of delivery, frequency of deliveries, differing forms of what may be regarded as personal attention, and to some extent on the advertising value of appearance or character of equipment and the courtesy of the men.

Obviously organizations, carefully de-

If the people willingly accept delivery economy the plan operated should be the best that business concerns can conceive.

veloped and systematized, with special equipment and distinctive policies, represent large investments and have substantial value so long as they are operated to standards recognized by the people. But these have no market value other than the prices that could be obtained for used vehicles, should there be cause for discontinuance. Garages or stables would have valuation at all time, but this would be entirely independent of the service.

What has been stated applies to distribution as operated by business enterprises. Each is seldom dependent upon other agencies. There might be, for instance, a number operating in a city, covering practically the same area, each to the system or plan which best met the requirements. Cooperative distribution, so that one organization might serve all equally well, is practically possible, but there are numerous conditions or factors which cannot be equated satisfactorily by those who might be served—at least so that one organization will afford what may be regarded as the same degree of satisfaction as independently operated equipment.

The foregoing statement should be

Store individuality is not dependent upon delivery service, but upon the qualities and the values understood by buyers.

qualified to the extent that as the service is or would be measured by the business man by his own standard, there would be much difficulty in devising what would meet with the same approval that might obtain with what would be controlled by the one concern

Business Men Abandon Delivery Service Representing Large Investments to Serve Nation

or individual.

The Council of National Defense appointed as members of its Commercial Economy Committee a number of the most progressive business men of the nation. The duty of this committee, as the

All delivery is paid for by buyers, but no profit is usually sought from it except through increased volume of business.

members understood it, was to make appeal to industry and commerce of the country, and through various organizations with which these are identified, for economies that would primarily release labor, so far as possible obviate non-essential works, and make practical the production of whatever might be necessary for the nation to prosecute the war.

Emphasis should be made that the committee is not in the first instance vested with administrative authority. Its duty is to advise and by stimulating patriotism bring about changes that will increase or at least conserve the resources of the country. The national committee organized state committees, and these in turn municipal or community committees, so that the work might be the better directed and applied. A general plan, sufficiently elastic to meet

Experience has proven that reduction of delivery does not decrease volume of sales nor appreciably influence customers.

varying conditions, was proposed, and this was submitted to the state and subordinate organizations, with recommendation that this be followed.

What the national committee regarded as of first importance was the reduction of store delivery, this applying to all stores so far as practical, other forms of highway haulage or transportation being secondary. This would seemingly lead to the conclusion that the committee had determined that what had been considered necessary in modern merchandising was as a matter of fact unnecessary in time of war, and could be materially reduced without sacrifice by stores, and with comparatively little inconvenience by the public.

Early in the summer of 1917 the committee made appeal to store operators

Delivery reduction could seemingly be extended to include all sales that can be practically carried home by buyers.

of the United States to minimize delivery as an economy. The stores in turn stated conditions to their customers, and modified their methods of operating delivery, the general result being fewer route deliveries a day. The economies

were as a rule devised by each concern's organization to best serve the needs of the community in which it operated and as a whole were very satisfactory.

But with the increased demand for labor and the urgent needs of the nation to be met first of all, still greater results were demanded, and this led to careful survey and recommendations which could be applied practically to all classes of stores. The one great encouragement the boards found was the attitude of the women, whose patriotism is intense, who accepted without criticism or adverse comment anything that would contribute to carrying on war.

Store operators the country over will maintain that they must satisfy the woman—that the men adapt themselves to conditions readily enough—and while delivery service has been very largely

Store delivery equipment not now used will not deteriorate in value and can be used whenever needed in place of rented vehicles.

created with the purpose of satisfying women buyers, they approved without question what they were aware would be in many instances inconvenient and less satisfactory. Not only this, they literally took upon themselves the burden of delivery, and today a larger proportion of goods sold in all stores than ever before are carried away by buyers—probably 95 per cent. of whom are women.

Had not the women so cheerfully responded to the appeal made them the results from commercial economy would have been exceedingly small. But with this encouragement and approval the boards were led to still further endeavors, and these will in turn lead to a very large measure of conservation of labor. Incidentally the degree of economy in numerical terms with reference to any one concern may appear small when

In ratio to the curtailment of delivery will be savings of buyers and release of man power—two important factors.

contrasted with the needs of the country, but if percentage is applied the ratio will be found surprisingly larger.

In August last the first reduction in deliveries was made through the endeavors of the national and subordinate boards, the maximum number of route deliveries daily being fixed at two, and in January in the larger commercial centers and later in the smaller communities the present recommendations were adopted. These are as follows with reference to non-food stores:

Deliveries—Not more than one delivery each day over each route—the day following purchase.

Minimum Free Deliveries—A charge of not less than 10 cents made for delivery of purchases valued at less than \$1.

Special Deliveries—For special deliveries a charge of 10 cents, plus any additional expense when outside of the ordinary delivery zones, a special delivery being understood to be any delivery by a special messenger for a customer unwilling

The highest degree of economy would be what would obviate duplication of delivery in given areas by all business concerns.

ing to wait for regular delivery, but not to include so-called specials caused through the operations of a store's alterations departments.

Returnable Goods—Any article of merchandise which, for some reason, is to be returned, must be offered for credit or refund within three business days from receipt; if for exchange, within seven business days, and at the price prevailing at time of return.

There are specifications relative to the acceptance of returned goods.

The recommendations for food stores are:

1—Customers must understand that they must give their grocery and provision orders expecting but one delivery a day.

2—Goods ordered before 12 o'clock noon (2:30 p. m. Saturday) will be delivered free the same afternoon.

No general plan can be free from all reason for rejection unless those affected by it want delivery economy above all else.

3—Goods ordered after 12 o'clock noon (2:30 p. m. Saturday) will be delivered free the next business day.

4—Orders for free delivery must amount to at least \$1 (sugar not included), not less than 10 cents being charged for delivery of purchases less than \$1 value.

5—On special or accommodation deliveries a charge of not less than 10 cents.

6—Customers are urged to take baskets to stores to carry small packages unwrapped to save paper, bags and twine, the cost of which is ultimately paid by the purchasers. Small food stores are required to live up to the second and third clauses only so far as will tend to decrease delivery.

These recommendations are reiterated

Business policies that prevent the largest delivery economies because of fear of competitors are not patriotic policies.

that there may be specific detail in the minds of readers.

To make specific illustration of results obtaining with any one store or in any one locality would not fairly reflect the economies realized as a whole by the ap-

Patriotic Women Approve Limited Delivery and Carry Purchases Without Remonstrance

plication of the restricted delivery plan. For this reason the subject must be dealt with in generalities, with certain exceptions with reference to sections of the country and in several cities. Reports have been made by different state boards to the national board which indicate a surprising uniformity of economy obtaining in the different classifications which have been restricted. Tabulations are difficult to apply because conditions constantly change. There are seasons when deliveries are larger or smaller.

Obviously tonnage is not a definite indication, and the most practical unit to use is packages or, in the event of food stores, separate deliveries, which might be made of one or a number of packages. There is another factor that must be considered, and that is the limited

The buyers can best serve their own interests by recognizing that the concerns making the largest economies are most patriotic.

purchasing under the rulings of the different state food administration, which do not allow buying in bulk in food products, so there would necessarily be a greater number of deliveries in handling sales were not a considerable part of the goods carried away by purchasers under what has been very generally advocated, the "cash and carry" plan, which is assumed to justify minimum prices.

The statement is made by Chairman Frederick W. Aldred of the Commercial Economy Board of the Rhode Island Council of Defense that the activities of his organization have probably obtained greater results than the commercial economy boards of other states, and this seemingly is based on the fact that because of the comparatively small area and the centralization of population a closer degree of cooperation is practically possible than is obtained in larger states. As a matter of fact the principal interests of the state that would be ac-

Recommendations of Commercial Economy Boards are not the maximum of economies sought, but to the contrary are minimums.

tive in this conservation are located in one community and results would be more quickly realized than where organization required considerable time.

To deal with specific instances of delivery economy would necessitate specification of operating conditions, and a better measure for the reader is percentage, which can be applied equally well to one or all. For this reason four principal items of economy have been taken—the number of vehicles, the number of men and boys, the number of special deliveries and the number of returns of goods—and comparisons of these show the results.

With reference to what has been accomplished in Rhode Island the tabulation of these items shows:

Class of Service	Percentage of Reduction
Delivery Vehicles.....	32
Men and Boys.....	40
Special Deliveries.....	40
Returns of Goods.....	63

These are averages applying to the en-

Every man released from unnecessary work lessens demand for labor for war service and increases the efficiency of the nation.

tire jurisdiction of the Rhode Island board. In some instances these figures are higher, the reduction of vehicles being 35 per cent., and in others lower, the minimum reduction of men and boys being 35 per cent., but with food stores the average reduction of employees is 25 per cent. The total economy will range from approximately one-third for vehicles, which indicates a saving of an average of more than one employee to a vehicle, and the material decrease of special deliveries and handling returns also releases a considerable part of the help for other service.

Women buyers wanted packages carried for them—now they are carrying a very large part of the parcels and make store economies.

What has been accomplished in other states has not been so well tabulated so far as making comparisons are concerned, but in returns made from 20 department stores in a number of principal cities the percentage of reduction of vehicles has been 33, the percentage of reduction of employees 36.2, while the percentage of returned goods ranges from 20 to 75.

Just what this means in economy may not be understood by the public as a whole, but vehicle economy is accomplished by re-routing in every instance. Assuming what was originally a three-a-day route is now served once a day—that the deliveries averaged 125, 100 and 75 for the respective trips. Excluding loading and driving to and from the routes the time required for this work might be 2½, 2 and 1½ hours, a total of

Results show the efficiency of delivery crews is no greater now than before the changes to meet the demands for economies.

six hours, or 360 minutes, and to deliver 300 packages would mean an average of a delivery each 72 seconds, which could only be accomplished with a helper, no matter how close the stops.

Obviously a reduction of vehicles would increase the route area and the route mileage and considering the percentage this would mean approximately a third more territory in a route, which would require more time to cover. There would be some gain of time in having one loading period instead of three and in obviating two returns from the route for the second and third loads, but this would not more than offset the added area. The actual number of deliveries governs the time of course.

The total deliveries, and the unit is usually a package or parcel, for such stock as furniture does not enter into the same classification as goods or commodities that are ordinarily distributed by route vehicles, has been reduced in Rhode Island about 40 per cent., which

Approximately the same number of packages a crew is now handled, the main saving being in the purchases carried away by buyers.

is somewhat in excess of the reductions made in other states. But assuming a case and regarding the old delivery as 100, the economy of vehicles would mean that distribution is made with 68 per cent. of the original equipment and that approximately 60 per cent. (in number) of the original number of packages is handled, with 60 per cent. of the number of employees.

Analyzing this further one finds that there is a better degree of efficiency than ever before obtained because some of the drivers are working without helpers (which accounts for the difference in reduction ratio between the vehicles and employees), and again there is very little if any difference in number of bulky packages. The delivery economy is accomplished largely through customers carrying their own purchases, and these are generally small, those that cannot be carried conveniently being delivered by the store equipment. As a matter of fact handling of large packages, both loading and delivering, requires more

Delivery cost has increased in ratio to all other operating expenses, and decrease of volume has added to overhead expense.

time than small packages, and the drivers or crews of the vehicles must work faster distributing them, so that there is even better work than is apparent on the face of the figures.

With reference to the actual store economy, there is usually reason to expect retention of equipment and facilities without modification, because there is no necessity for sacrificing it by sale, especially when a large measure of economy may be realized by merely withdrawing it from use, so that there is little if any reduction of overhead expense, but the operating cost is clear gain,

Rhode Island Department Stores Plan Cooperative Suburban Service to Further Economize

while there is a reserve of equipment that will frequently serve a useful purpose. The operating cost will vary, but where light vehicles are used with drivers and helpers it is large as compared with heavy machines, no matter what the standard of measuring expense may be.

Broadly speaking stores have a unit of

Reduction of volume of packages delivered has increased the cost of distributing each unit, varying with each store.

cost, which may be package or parcel, or possibly a delivery, which means a customer served instead of the number of packages delivered. Whatever the unit, there will be variance of cost with reference to each store. Compared with the cost of delivery before the beginning of the European war delivery expense has increased from 20 to 35 per cent. a unit, provided, of course, that the quality of service has been maintained, despite the endeavors to economize. The customers have paid for this increase, which has been included in the prices charged for goods.

As stores are generally competitors in business and cannot exact whatever prices might be fixed without sacrifice of their own interests, there is reason to assume that whatever economies are obtained are reflected in the values placed on goods and the buyers directly benefit, although there is no specific statement that this is a fact. But disregarding the buyers and considering only the release of employees for essential war work, there is a decided gain. Probably no other business interests can show so large a release of labor without sacrificing patronage. So far as surveys have been made no store management maintains that reduction of delivery has been followed by lessened custom. In most instances the statement obtains that while necessities and essentials are more generally bought than what can be classed as non-essentials or luxuries, there has been, save in rare instances, increase of volume of sales and measured by units rather than values.

What has been stated applies specifically to department stores and large food stores in New England, especially in

Stores make no profit on delivery. Any economy that can lessen selling values is not too trifling for store operators to consider.

Providence and Boston, the largest cities of this section, which collectively attract patronage from approximately 25 per cent. of the population of the New England states. What has been accomplished has been by direct appeal to the business men and through them to the buyers, and exceedingly satisfactory results have been obtained without direct

pressure or restriction. There is probability that even greater economies could be brought about by specific regulations enforced by national or state authority.

There is reason to believe that the smaller food stores are not making the same degree of endeavor to economize delivery, nor are they obtaining the same ratio of results, which may be due to the

Any plan for cooperation must comprehend the best service that can be applied to all interests equally and fairly in all details.

attitude of their customers, although in view of the willing acceptance of the plans of the large stores there should be no fear of unwillingness to accept similarly restricted distribution.

Plans are now making in Providence for the organization of cooperative delivery to the suburban sections which are served by the large stores. Whether this will be operated by one or several independent companies to which business will be guaranteed, and which may be possibly organized to handle the distribution of stores in the various cities surrounding Providence, or will be a company owned and operated by the stores is yet to be determined.

The plan is one of the most comprehensive ever conceived for a community of the proportions, for the cities of Providence, Pawtucket, Central Falls and Cranston, with their suburbs, have a combined population of close to 600,000. The proposition is to develop what will be the most economical after a survey has been made, which will obviate duplication of service to towns and cities within a radius of 15 miles of Providence. Bids may be invited from haulage contractors or those who may specialize this work when definite facts are known, and if these are not satisfactory the stores may organize an operating company to take over the delivery outside of Providence and obtain the cooperation of the delivery of all stores of proportions in the adjacent towns.

This will apply especially to the department and large food stores, and as many of the smaller stores as may be concerned in such a plan. Whether or not the zone plan, with transfer to suburban delivery stations from a cen-

Cooperative delivery will afford the greatest saving of man power and the most economic service if practically planned for.

tral collecting station in Providence, will be adopted is uncertain. There is possibility of this, or an alternative plan of starting suburban delivery from a central station at Providence. Or another possibility is the stores maintaining their own one-delivery-a-day routes in Providence and the other cities, but co-operating in suburban delivery outside of

Providence. Several meetings have been held and the different propositions are now under consideration.

One will understand that as a war economy the stores are willing to sink the individuality of their respective delivery services by so combining, and that this is a material sacrifice for them, for the present distribution policies have

Cooperative delivery may be afforded by service owned by stores or by independent companies operating purely on a merit basis.

been long established and have been developed at large expense and unceasing work.

In Boston the reduction that has been accomplished has been reasonably parallel to the results obtained in Providence, and the large stores of that city have made substantial economies in reduction of deliveries. The ratios of economy vary with each large store because the operating policies differ, but generally speaking each has reduced its route deliveries to one a day, delivery being made the day following purchase, although there may be some variance to obtain better economy than would be possible were an arbitrary schedule the vogue with each.

The Houghton & Dutton Co., operating a large department store, voluntarily reduced delivery prior to the suggestion of the national board, so that the drivers might complete their work by 7 o'clock in the evening, and later on conformed to the request of the national board for one delivery a day, although there may be instances where an extra trip over a route may be more economical than to hold goods that must be taken out and will cause delay and congestion if held. The modification of the service has lessened the number of packages delivered from 30 to 40 per cent. because the aggregate total of units carried away from the store has been very large. The number of drivers released will also range from 30 to 40 per cent. numerically and the total of vehicles is in corresponding ratio. The number of special deliveries is not as greatly reduced as with some other stores because the system is such that these were not as numerous as with this concern, but there has been a sub-

Duplication of distribution is unnecessary and an extravagance that should not be tolerated when economy is vitally needed.

stantial reduction.

The Jordan, Marsh Co., Boston, which is the largest store of the kind in New England, has also followed the general plan of delivery reduction with economies that very closely approach those experienced by other stores, and while no specific figure is stated for any classification, statement is made that very

Elimination of Route Duplication by Cooperation of Stores Both Possible and Practical

substantial release of drivers has been effected without dissatisfaction in any way on the part of buyers. This company has always maintained a very high grade service, valuing appearance of its vehicles and the personal attention of its drivers more than other stores and making distribution to a very carefully developed schedule, not only in Boston, but in all suburban cities and towns within a radius of 15 miles by its own equipment, and throughout New England by freight, express and parcel post.

For years this concern has served its customers more intensively than any other store in New England. It has a shipping department in its annex building that has no superior in the country so far as equipment goes, and its vehicles have been a conspicuous type that have had distinct advertising value. This company has reduced its organization largely as compared with what it operated early in 1917, and has, of course, more business than at that time, but while the number of drivers and helpers is smaller (two to each vehicle operated), the equipment is retained. The customers have adopted themselves to war requirements cheerfully and operating expense is considerably curtailed.

In Boston aside from the delivery organizations of the large stores, two independent concerns are operating store delivery exclusively, the one being the Boston Parcel Delivery Co. and the other the Boston Clearing House Parcel Delivery Co., the former using horse equipment and affording service in which is known as Boston "proper," or within a radius of 2½ miles of the Massachusetts State House, and the other using power vehicles and distributing in the city and suburban sections within a radius of 12 to 15 miles. The city delivery company has been operating since 1872, but the other has been organized within four years. Both follow a central station plan, collections being made from stores that use the services and taken to stations where the packages are sorted for routes and then delivered, routes being covered as frequently as is necessary.

Services of the character afforded by these companies cannot be regarded as comprehended by the recommendation of the national board from the fact that regular distribution is planned, there being no duplication, and one general delivery, for instance serving a number of stores. As the companies are paid on the basis of packages delivered, and a definite price a unit, quick and efficient work is essential. The greater the number of deliveries the larger the revenue, and the more work done with each vehicle and crew the greater the earnings. Logically the overhead charge a unit decreases with the increase of number delivered.

The practicalities of distribution with both power and animal vehicles have been well determined during the periods of operation. The companies do not in a general sense conflict, because one oper-

ates exclusively in the city and the other serves the city and the suburbs, but the larger part of the business of the latter is suburban. The largest store having the Boston Clearing House service is the Shepard, Norwell Co., which may be regarded as the smallest of the Boston department stores, but a considerable number of various proportions are served by it. Various propositions have been made to the Jordan, Marsh Co., William Filene's Sons Co., Houghton & Dutton Co., R. H. White Co. and other less important concerns to take this service, but for different reasons these have never been accepted and independent operation of equipment has been continued.

The Boston food stores, a number of which are large, operate their own delivery services, and there are several concerns operating chains of stores to which distribution is made by their own vehicles within a radius of approximately 10 miles, and by contractors beyond that radius, but no delivery is regularly made from these small stores. The reduction of delivery by the large food stores has been material, but there are no statistics by which the ratio can be specifically stated.

AIR-O-FLEX TRUCK PLANT.

A manufacturing plant at 217 Franklin street, Detroit, has been acquired by the Air-O-Flex Automobile Corporation, and if plans are not changed production of vehicles will be begun about Aug. 1. Later on the company expects to devote its activities to manufacturing suspension equipment. A design for an ambulance that will have carrying capacity of 20 persons, including one on the seat with the driver, has been submitted to the government for army service. The value of this is that it will carry the number specified against from four to eight now carried by standard type ambulances. The design is now being considered by the War Department.

WILL BUILD NEW SERIES.

Construction of a new series of truck chassis, which will have load capacities of 3000, 5000, 7000 and 10,000 pounds will be begun by the United Motors Co., Grand Rapids, Mich., about July 15, and deliveries will be made about 60 days later if there is no retardation of production. The output of the company is normally fixed at 50 machines a month. No announcement has been made as to the prices for the new series units.

The retail sales and sales promotion of the Hurlburt Motor Truck Co., New York City, are now in charge of Frank Jepson, who was manager of the sales promotion department for the Firestone Tire and Rubber Co.

Under the name of the Auto Service Co. a branch has been established at Newark, N. J., by the Eisemann Magneto Co.

Highway Neglect a Double Tax

Highways for public use must be built and maintained with money raised by taxation. The taxpayer believes a low tax rate and low property valuation is ideal, simply because he measures what he pays by a known standard—dollars and cents—but does not know what he indirectly pays through large expense for transportation on poor highways, and through waste of investment from neglect to maintain existing roads in the best possible condition.

This point is emphasized by Robert U. Burnett, engineer of the state highway department of Missouri, which indicates that state departments are realizing the economies possible with good highways. He states: "Rapidly increasing use of the motor truck makes it necessary that more attention be given to the economic principles of highway transportation, in order that the lowest cost per ton-mile may be obtained for the ultimate consumer and the taxpayer. Too often the fact is overlooked that in the end the community bears directly and indirectly the cost of highway transportation. Many regard the cost of operating over the road as the only cost of transportation. This is a serious error. The individual who eventually receives the goods must pay, in addition to the operating charges, his portion of the expense of constructing and maintaining the highway. It is the individual—the ultimate consumer and taxpayer—who primarily is interested in reducing the cost per ton-mile."

NEW MIDLAND MOTOR TRUCKS.

James M. Aydelotte is president, Floyd Thompson vice president, George L. Cooke treasurer and Robert P. Inglis secretary of the Midland Motor Car and Truck Co., Oklahoma City, Okla., which is shortly to begin manufacture of a truck having load rating of 4000 pounds. The chassis will be constructed of standard units.

The Parry Manufacturing Co., Indianapolis, Ind., has appointed J. H. Barnett, formerly with the Prest-O-Lite, Swinehart Tire and Rubber and Firestone Tire and Rubber companies as advertising manager.

The sales promotion department of the New York branch of the Kelly-Springfield Tire Co. has been placed in charge of D. Y. Husselman, formerly office manager of that branch.

The Pacific coast advertising representative of the Firestone Tire and Rubber Co., H. G. MacEachen, has resigned to join the United States army.

The New York-Fulton Truck Co., 1800 Broadway, New York City, has made Norris Mason sales manager.

ARTILLERY TRACTOR IS PROVEN IN FIELD TESTS

IT HAS long been realized that the distance an army may advance in a major offensive is limited by the range of its guns, and when it has advanced to their extreme range it must await the bringing up of the artillery to a new position. This is often a slow and difficult operation because of the rough character of the ground to be traversed and the heavy weight of the ordnance material to be transported.

The application of the motor to this class of service very materially reduces this time and affords an advantage that might easily prove decisive in a battle to the army possessing superior motor equipment. There are also many other advantages possessed by motorized artillery, among which may be mentioned the following:

Napoleon said, "An army travels on its stomach," which is especially true of the artillery, as in order to forage a horse drawn regiment of six-inch howitzers, it is necessary to provide nearly 15 tons of food a day, and this consumption goes on whether the animals are doing active work or remain idle.

Great Saving in Freights.

A motorized regiment on the other hand uses only four tons of fuel, oil and grease (and this consumption ceases when not on the march) in traveling 50 miles, which, incidentally, is a two days' march with horse equipment. In addition the smaller space required for transportation of one tractor in comparison with that required for 16 horses, and that of fluids against grain and hay, is a most important factor in overseas transportation where every inch of cargo space is of inestimable value.

Tractors are more easily camouflaged than horses, effect a saving in leather used for harness, a most important item

in view of the now serious problem of leather production; the output of tractors is practically unlimited, whereas the supply of horses is becoming more limited every month.

Bearing in mind these and other advantages, the Ordnance Department of the War Department has succeeded in developing certain types of tractors so that exclusive of the heaviest field artillery mounted on railroad carriages, practically all American artillery will be motorized.

Tractors a Tracklayer Type.

The basis of all the tractors for this service was the tracklaying tractor used for agricultural work. Radical changes had to be made, however, in order to adapt it to artillery service.

A most successful test was held during the week ending June 8, 1918, by the Ordnance Department in Rock Creek Park, Washington, of a five-ton tractor hauling a 4.7-inch howitzer and its limber. The test was witnessed by the secretary of war, Newton D. Baker; the chief of staff, General Peyton C. March; the acting chief of ordnance, Brigadier-General C. C. Williams; a number of army officers, members of the Senate and House Military Affairs Committee, and representatives of foreign governments.

The tractor is equipped with a standardized motor capable of developing 54 horsepower. The weight of the tractor is 9000 pounds, and that of the limber and gun, an additional 10,000 pounds.

Surmounted Many Field Obstacles.

Hauling the gun the tractor negotiated the most difficult grade, ploughing through mud and clay a foot deep. It continued on over underbrush, pushed down three-inch saplings, mounted and climbed over tree trunk obstructions

that were two feet above the ground, then nosed down into deep pits and climbed out on an almost perpendicular bank.

The tractor can turn in its own length, by locking the track on one side and applying full power to the other side.

The tractor is easily steered and so armored as to render its engine, radiator and fuel tank shrapnel proof. It can only be disabled by a direct hit.

The speed with which this machine has been developed and placed in production is one of the accomplishments of the Ordnance Department, which should materially assist in the winning of the war.

While much work had been done on machines of this general type, it was not definitely determined until Nov. 24, 1917, that a machine of the particular size of the one tested was required.

On that date there were only preliminary drawings. Engineering work was immediately rushed and large production orders placed. The first experimental tractor was produced in 27 working days and was shortly followed by others, which have been run thousands of miles to determine any changes that might be necessary in the finished product.

Deliveries are now beginning. In other words, design, experimentation and deliveries of a vehicle necessarily embodying a great many special features has been accomplished in a period of less than seven months.

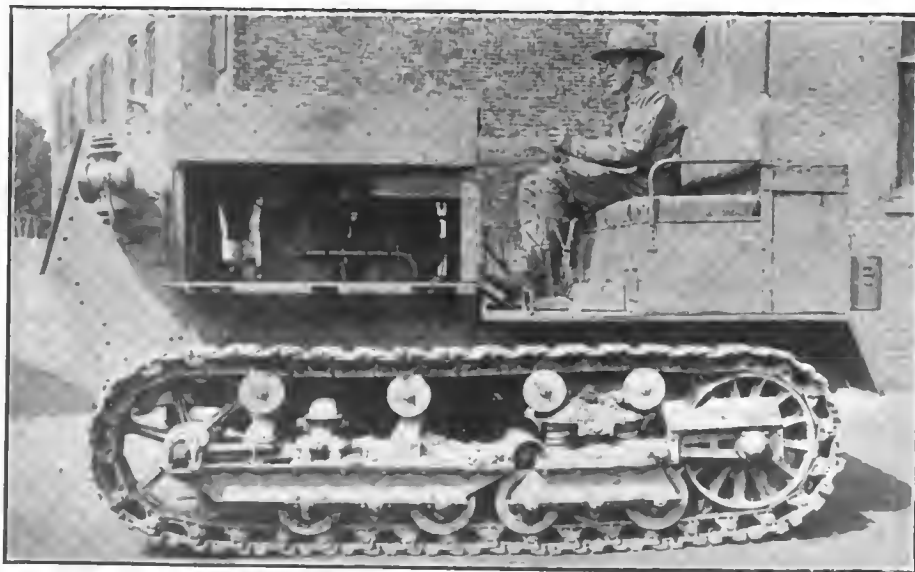
SCHOOL FOR TRUCK DRIVERS.

The Lane Motor Truck Co., Kalamazoo, Mich., maintains a school at its plant where the buyers of trucks may have their drivers trained for whatever period may be desirable to insure their competency in driving and meeting conditions that may develop in general service. The men are taught to drive, to make adjustments and to recognize whatever results may be anticipated in normal use, so that they may make restoration intelligently, with the lowest possible expense and the least loss of time. The plan has worked out exceedingly well and has insured a greater degree of satisfaction with truck owners.

An addition of considerable size is being made to the plant of the Milwaukee Die Casting Co., Milwaukee, Wis., to meet a large increased demand for die cast bearings for engines and other machinery.

The Fulton Motor Truck Co., Farmingdale, N. Y., has made S. W. Croxton, Jr., formerly head of the Birchfield Agency and Sales Service Co., Cleveland, head of its retail sales promotion department.

Production of a 2000-pound load capacity truck chassis has been begun by the Briscoe Motor Car Co., Jackson, Mich., and deliveries will be begun during August if nothing unforeseen eventuates.



Tracklaying Type Tractor Developed for Field Artillery Haulage by the Ordnance Department, U. S. A., That Has Proven Extremely Practical for Field Service.

SIGNAL TRUCK CO. FOUNDER JOINS CLYDESDALE.

The policy of the Clyde Cars Co., Clyde, O., builder of Clydesdale trucks, is to be very aggressive so far as promotion and sales campaigns are concerned, this having been determined upon when A. C. Burch, now vice president and director of sales, retired from the presidency of the Signal Motor Truck Co., Detroit, of which concern he was founder, to associate himself with the Clyde company. The sales organization is to be developed under the supervision of Mr. Burch, who from long experience is qualified for this particular duty, while his general knowledge of the industry will be directed as well toward formulating the policies of the company.

Mr. Burch began his association with the industry with the Packard Motor Car Co., with which he was connected from 1907 to 1912, first in the shops and later



A. C. Burch, Vice President and Sales Director, Clyde Cars Co.

in the sales department. Then the Signal Motor Truck Co. was founded, Mr. Burch being its president until his retirement, where he had much valuable experience both in manufacturing and in distributing. He is widely known in the industry and trade and has intimate personal knowledge of the conditions and problems with which those selling trucks must deal. He will be permanently located at the offices of the company at Clyde, O.

The distribution of Federal trucks in eastern Nebraska is now made through the Nebraska-Federal Truck Co., which has offices and salesrooms in Omaha and Lincoln.

The manufacture of 2000 and 3000-pound load capacity truck chassis is to be begun by the E. A. Myers Co., Pittsburgh, Pa.

BARKER DIRECTS SANFORD ADVERTISING.

Robert M. Barker, who is well known as an advertising advisor both in and apart from the power vehicle industry, has been made director of advertising for the Sanford Motor Truck Co., Syracuse, N. Y., builder of Sanford trucks. Mr. Barker has been specializing in advertising for 18 years, his first work after being graduated from Harvard University being assistant to the advertising manager for Swift & Co., the Union Stock Yards, Chicago.

After three years with this company he became associated with an advertising agency in New York City, where he remained for six or seven years. He then returned to his former home at Syracuse, where he became manager of advertising for the Chase Motor Truck Co., and retired from that connection to join the Palmer-Moore Co. of that city in a



Robert M. Barker, Director of Advertising, Sanford Motor Truck Co.

similar capacity. He was with this concern more than three years, until it discontinued production.

The Art Metal Manufacturing Co. is now located in a larger plant at 217-25 West Huron street, Chicago, where additional manufacturing equipment has been installed for the production of tubing, mouldings, stampings, etc., and there are better facilities for shipping.

Cole & Dixon, Inc., has established salesrooms and a service station at 204 Washington avenue, Albany, N. Y., which is in charge of W. R. Mason. The company is agent for Denby trucks and Smith chassis conversion units.

Having been reorganized with capital of \$150,000 the Globe Motor Truck Co., East St. Louis, Ill., will produce a series of trucks having 2000, 3000 and 4000 pounds load capacities.

DUVAL HEADS WINTHER NEW YORK BRANCH.

R. Duval Dumont, until recently one of the three leading salesmen of the General Vehicle Co., and formerly with the Motor Vehicle Bureau of the New York Edison Co., has been elected vice president and sales manager of the Winther Truck Co. of New York, which has salesrooms and service station at 614-20 West 57th street, New York City. The company maintains what is practically a factory branch, having more than 10,000 feet of ground floor space, a finely equipped shop and service facilities, a large stock of spare parts and salesrooms that will afford ample opportunity for displaying machines.

The company itself has adequate resources and has organized a sales force of high grade men. It will operate in 12 counties in New York state, including New York City, all of Long Island, nine counties in New Jersey and two in Con-



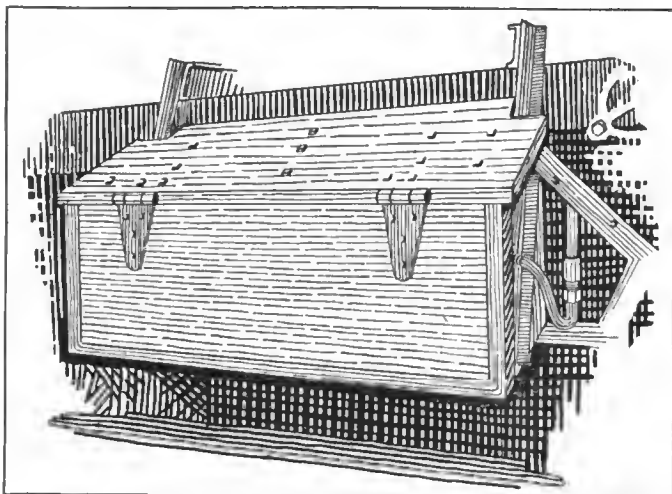
A. Duval Dumont, Vice President and Sales Manager, Winther Truck Co. of New York.

necticut. In the operating organization are Service Manager W. H. Kelley, formerly with the Fiat, Packard and General Vehicle companies; eight General Vehicle shop men and E. P. Risbrough and E. T. Walton from the Garford and White companies. The sales force has been developed to produce results and it has unusual strength. The company has a considerable stock of Winther machines, which are built in six different sizes.

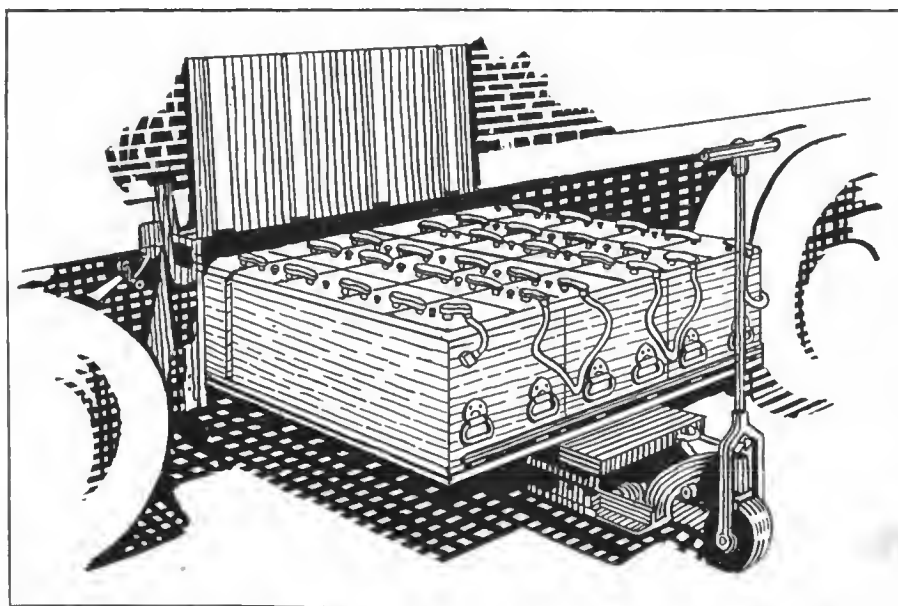
A factory branch has been established by the Lane Motor Truck Co., Kalamazoo, Mich., at 27-29 Broadway, New York City, which is in charge of A. W. Martin, who will direct sales in the eastern states.

The capital of the Standard Motor Truck Co., Detroit, has been increased from \$50,000 to \$500,000, which will make largely increased operations and production possible.

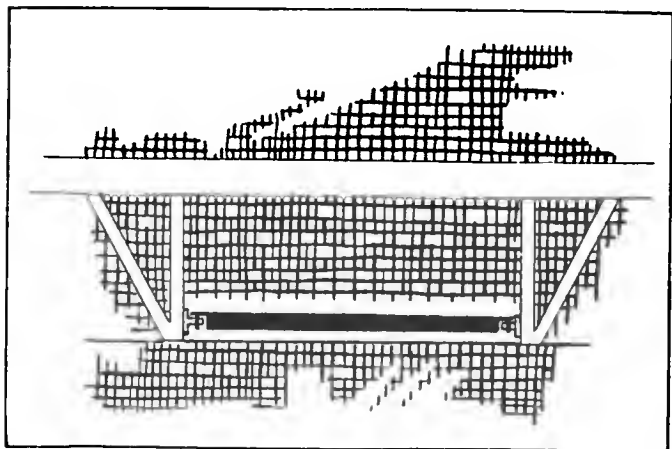
CHARACTERISTICS OF TRUCK DESIGN



Exterior of the Stone Patent Battery Compartment, with Side Door Closed, a Feature of the Model 58 Couple Gear Truck.



Stone Patent Battery Compartment with the Side Door Raised and the Removable Floor and Crates Partly Withdrawn on an Elevating Jack.



Truss Supporting Floor of Stone Battery Compartment, the Dowel-Ended Longitudinal Member Shown by the Black Shading Between the Vertical Members.

POWER truck design, now regarded as conventional by engineers, is the two-wheel driven, and trucks or tractors with the power applied with either one or four wheels are exceptions to what has been accepted as practical vehicles, but there are excellent engineering reasons why all of these types are desirable and each has certain qualities that sufficiently justify producing them commercially. Generally speaking simplicity is a primary quality sought by all vehicle builders, from the fact that manufacturing economy is the basis for establishing market value, and the machine that has the fewest parts, other qualities being equal, would logically be preferred by average buyers.

Simplification may be regarded as more scientific than any other engineering result because this cannot be accomplished without careful study of construction and precise knowledge of the relations and proportions of all parts to each other. While simplified construction may be from one viewpoint obtained by elimination of non-essentials, it is only obtainable by the use of high grade materials and usually by so proportioning each component with reference to the wear and stresses that there will be uniformity of structural strength.

The power vehicle chassis differs from practically any other mechanical construction in that it has to endure extreme overloads, not only with reference to the weights carried, but to stresses that result from inequality of loading, from impact of road shock, from emergency braking and from accident, and good engineering demands that these be borne without deterioration or gradual weakening of the structure.

The ideal construction is that which has a sufficient resiliency, yield or flexibility, so that stresses may be absorbed to a certain degree as the spring, which will absorb shock quickly, but will endure great pressure gradually.

Theoretically any shock or stresses that cannot be absorbed, which may be likened to a hammer blow, is far more destructive than a far heavier strain that will be given so slowly that it can be wholly or in part absorbed, and the use of springs between the load carrying frame and the axles is to reduce so far as possible the stresses that would obtain were the vehicle structure rigid, or without spring suspension. But the springs absorb the vibrations resultant

from normal vehicle movement, that eventually cause fatigue or crystallization of the metal and gradually lessen the elasticity or power of shock absorption.

While a design may be followed in the building of a chassis in dimensions and proportions, obviously much depends upon the quality of the metal of the components and especially the springs, for these must afford protection for the power plant and power transmission system from road shock and vibrations, and conversely protect the tires having traction from the excessive wear caused by hammer blows in combination with the driving thrust upon them. In any event the slower the action of the springs the better will be their absorption under a given load, and the greater the length the more complete will be shock absorption. No standard has been accepted by engineers as to what proportion of the chassis frame length shall be the length of the springs, but the general tendency of those who have given this detail of design careful attention has been to increase the aggregate spring length, and seemingly some care has been given to determining the ratios of length of front and rear springs, or the spring proportions that will afford the best degree of suspension.

As a matter of fact spring proportioning is a subject that

ought to be given quite as much, if not more, study than any other detail of vehicle construction, because of the degree of chassis protection that will obtain through good springing, but frequently it is not regarded as having its true value. Very often the engineer who undertakes to assemble a chassis from standard units determines the principal components and leaves to a spring maker the selection of the dimensions that appear best suited for such a vehicle as is contemplated. The spring manufacturer has formula and methods of determinations with reference to loads that are based on experience and which serve a very satisfactory purpose, but often lack of precise information or other limitations preclude anything more than production of springs that will be practically adequate.

What may be considered as ideal suspension, in that the load is carried between two points of support, is the "buckboard" type of vehicle, which has no springs, the passengers being protected from shock by the long plank or board mounted at either end on axles. The support settles in ratio to the load until a normal weight or "load line" is reached, and deflection is always below this, there being rarely reflection above it. This is diametrically opposed to ordinary spring action, in which the reflection practically equals the deflection and there is necessarily "end throw" proportionate to the extension of the ends of the frame beyond the axles. The shorter the wheelbase the greater the spring action until well loaded, when a condition more nearly approaching that of the "buckboard" obtains.

Truck Springs Must Carry Loads.

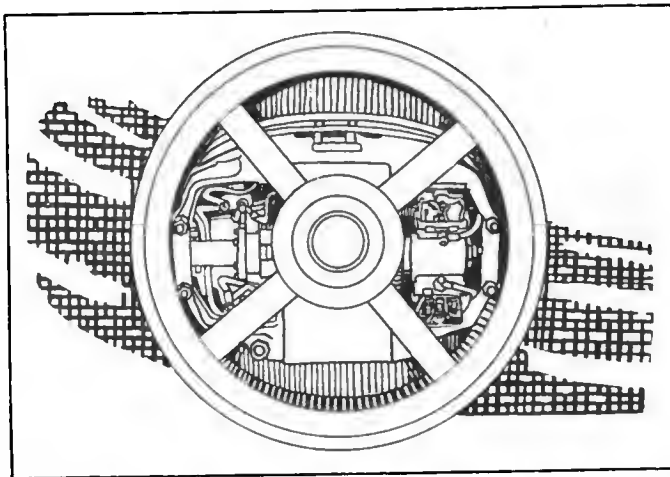
Truck springs must be stiff until fully loaded, and because of this fact there is little or no action and but a small degree of the protection from vibration and shock when the vehicle is driven unloaded. This condition cannot be changed even by good engineering unless such construction shall be devised that there shall be comparatively light and elastic springs that will afford sufficient support for the frame, power plant and body when light, and larger and heavier springs that will begin to support the load as it is added, the two series of springs serving as one series now does.

The spring suspension of the model 58 five-ton truck built by the Couple-Gear Electric Truck Co., Boston, has been worked out with unusual care with a view of obtaining the fullest degree of frame flexibility and strength and support that is exceptional. The wheelbase length of the chassis is 142 inches, the loading space 164 inches and the overall length 212 inches, the back of the driver's seat being approximately even with the tires of the front wheel, perhaps 18 inches behind the centers of the spindles of the front axle. The spring length is 76.05 per cent. of the wheelbase, 65.85 per cent. of the loading space and 50.95 of the overall length.

Couple-Gear Springs Long.

The forward springs are 50 inches long and the rear springs 58 inches long, a total of 108 inches, which is claimed to be much longer than is conventional practise and which is intended to have a very large degree of protection for the battery, which is carried in a cradle or compartment under the chassis, between the springs. The cradle is seemingly unusually large and there is comparatively little space back or forward of the front hangers of the rear springs and the rear hangers of the front springs. The front springs are pivoted into hangers at the forward ends of the frame side members, but the rear ends of this set and both ends of the rear springs are shackled to have the fullest degree of resiliency and the springs have very small arc, so that when loaded they are practically flat in the rear, but the forward springs have slightly more arc to have clearance.

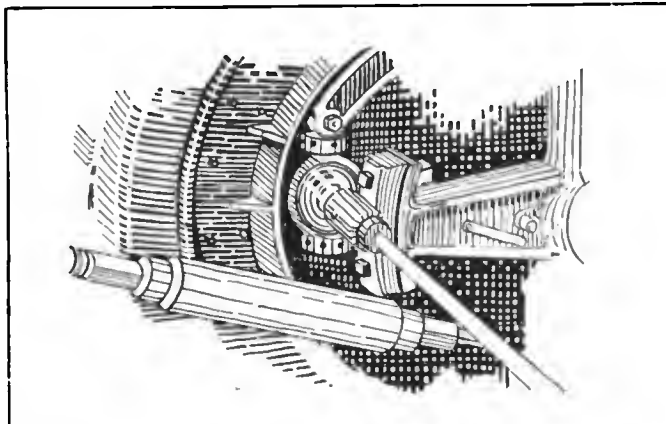
The battery compartment is a patented construction that consists primarily of a permanent wooden top and ends, with removable floor and folding sides that can be lifted to remove or replace the battery trays. The frame is reinforced at the forward and rear ends of the compartment by two wide transverse steel angles, with two other angles of the same size forward and back of them. The two middle angles carry the battery compartment construction, and the others reinforce the frame at the rear hangers of the front springs and the front hangers of the rear springs. These angles serve as bolsters on which the body is mounted, one or two wooden bolsters being placed at the rear end of the chassis frame.



Latest Five-Horsepower Couple-Gear Wheel, the Spider Taking the Place of the Steel Disc That Encloses the Motor and Pinions and Racks.

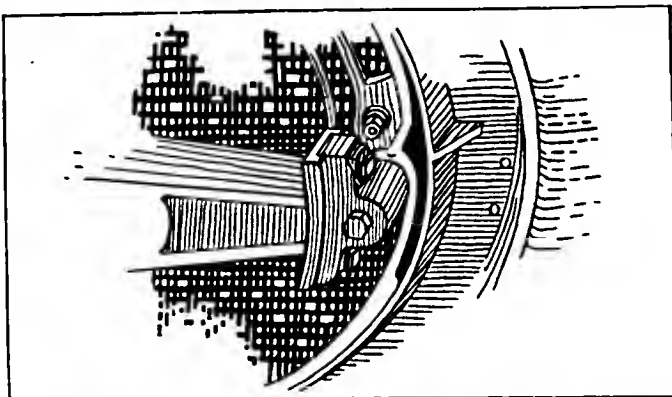
Construction of the Battery Box.

Directly under the ends of the two middle angles are riveted two vertical steel members. Transversely between the lower ends of the vertical members are two steel channel sections, with the channels forming guides, across the frame. From the side members of the frame in front and back of the battery compartment diagonal braces are carried to the ends of the vertical channels. This construction then is really

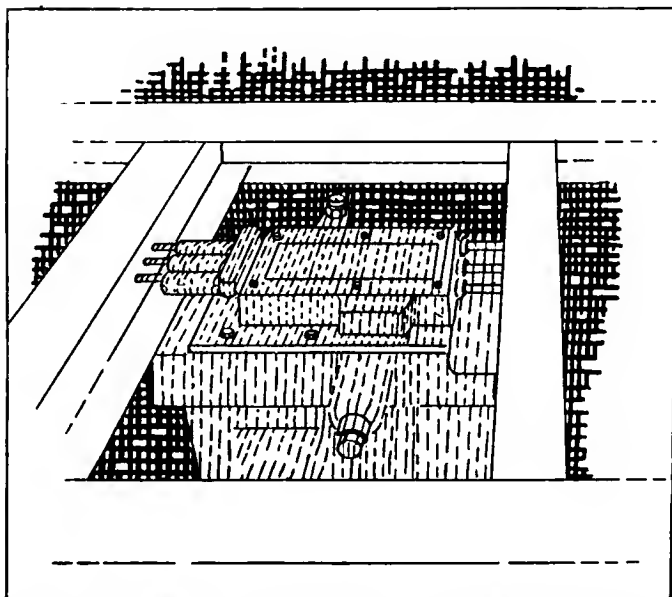


The Patent Radius Rod of Model 58 Couple-Gear Rear Driven Trucks, the Cylinder Housing a Helical Spring Having Ample Shock Absorption.

two vertical frames that carry the front and rear ends, and between the upper transverse angles under the main chassis frame the top of the compartment is placed. The ends of the compartment may be extended considerably beyond the frame side members. From the sides of the roof the upper sections of the compartment are usually permanently fixed at angles varying from 30 to 45 degrees, although by extending the rod the sides may be made vertical. If diagonal upper sections are desired these are convenient from the fact



The Massive Spider Carrying the Anchor Studs of the Internal Brakes of the Couple-Gear Model 58 Truck, the Drum Being Bolted to the Wheel Rims.



The Four Forward Speed Ratio Gearset of the Power Transmission Systems of Federal Trucks Carried Between Two Cross Members of the Frame on Three Points.

that the lower sections can be folded against them when the compartment is opened, but the full doors may require latches or hooks to hold them open.

The floor of the compartment is wood and is built with solid wood cross members, but on the under side of this are three steel members with the ends deeply notched to form what may be regarded as pins, that are known as "dowels," that fit into the channels of the steel cross members at the bottoms of the front and rear of the cradle. These "dowels" slide in the channels in removing or replacing a battery of cells. With the weight of the battery crates on the floor the ends of the steel members seated in the channels complete a truss, that fully reinforce the chassis frame, obviating sag or buckling, and making a comparatively light frame exceptionally strong.

Ease of Battery Removal.

When removing a battery from the cradle an elevating jack is run under the floor and lifted, and this raises the floor so that it may be drawn out easily and quickly. The battery can be drawn wherever desired and the floor and crates lowered on blocking or skids. Replacement is merely reversal of this process. Whenever the truck is in motion or supporting a battery the truss is complete. The main advantage besides ease of removal is wider distribution of the load on the frame, the bracing of the frame against side sway, the accessibility of the compartment for cleaning or other work, and that no tools are required. When the jack is lowered the battery is automatically locked until lifted. Further than this there is the complete accessibility of the crates when removed, which minimizes the labor of maintenance and repair. The compartment is made dust and water tight and exceptional protection of the battery cells is obtained. Saving of much time and labor is practical where battery exchange service is the practise.

An advantage with the sloping upper side sections of the battery compartment is that dust cannot accumulate and can be easily removed by dusting or washing and the compartment joints and seams cannot open from stresses of chassis distortion.

Driven by Two Wheels Only.

The truck is driven by two rear wheels, built by the Couple-Gear Freight Wheel Co., these having motors that are a four-pole type having five horsepower by railway rating. The motors built by the Couple-Gear company prior to this series were a two-pole construction rated at three horsepower each, but four were used to a truck, giving a total normal power rating of 12. These motors will endure for a short time a 200 per cent. overload, so that the maximum horsepower available for emergencies is 30 with the model 58 chassis against 36 of the four-wheel driven truck.

The two-pole motors were mounted similarly, on stub axles with the armature shafts horizontal, with pinions on the ends of the shafts meshing with racks integral with rings fitted into the rims. The motors, being larger, have commutators of increased size, with corresponding sized brushes, and the armature shafts are mounted in annular ball bearings. The frames carrying the motors are cast from a high quality of steel and the frames are open so that there will be sufficient air to cool the armatures. The frames of the motors also serve as the axles for the wheels, the wheels being formed of steel discs fitted into the rims and the discs mounted on Timken roller bearings that are adjustable for wear. The earlier type wheels were fitted with plain axle bearings which were not adjustable. The gear reduction through the pinions and racks is 25 to one, so that there is comparatively slow movement of the wheels, even when the chassis is driven at top speed, and there is relatively little wear of the bearings. The wheel pinions and gears are lubricated through hand holes in the outside discs of the wheels, and because the wheels are dust and water tight require attention very infrequently.

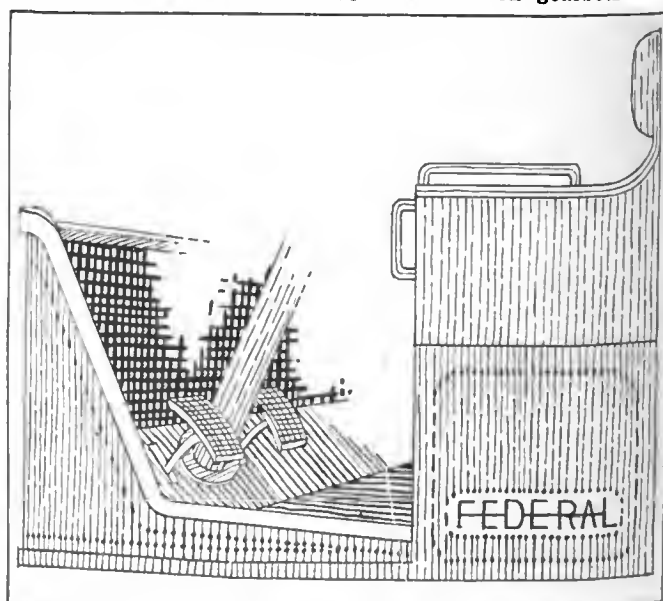
Rear Axle a Truss or Bridge.

The rear axles of the chassis are a truss or bridge construction of steel rods and bars that has extreme strength and is comparatively light. The axles are expected to have slight forward and backward movement with the action of the springs, but the relation of the axles are maintained by radius rods that are pivoted to have vertical movement at either end, with helical spring buffers about midway of their lengths that are enclosed in telescoping cylinders, and after the initial lubrication these need no attention. These buffers have a total movement of $1\frac{1}{2}$ inches, which is largely in excess of any requirement, and will effectually absorb any shock to which the wheels or axles will be subjected.

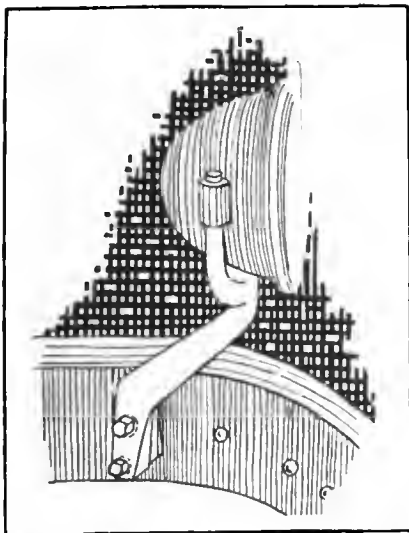
One of the features of this truck is the brake, which is maintained to be exceptionally efficient. On each driving wheel is a cast steel brake drum 29 inches diameter that has reinforcing webs and is bolted to the wheel rim. The ends of the axle are constructed with spiders having four arms, the vertical arms carrying the transverse members of the structure, the rear arm ends the anchor studs for the internal expanding brake shoes, and the front arm ends the brake shaft, the cams of which actuate the brake. The brake drum is open and the construction is such that the shoes can be easily adjusted, both for position and for the application of pressure, so that the brake action can be made whatever will be practical or desirable, according to the conditions in which the truck is operated.

Four-Speed Federal Gearsets.

The Federal trucks in excess of 2000 pounds load capacity have sliding gear selective type transmission gearsets with



The Heavy Dash of Federal Trucks of Stamped Steel Surmounted by a Solid Cap That Prevents Bending or Damage from Striking.



The Drop Forged Steel Lamp Brackets of Sterling Trucks, Offset to Give Clearance of the Radiators.

four forward speed ratios. The claim is made that these gearsets are comparatively small and compact, the countershafts being under the main shafts. The cases are semi-steel and are mounted amidships on two frame cross members, being secured by four through bolts. The shafts and the gears are extremely large, the shafts of special alloy steel and the gears of chrome nickel steel, heat treated and ground to exact size. The gears are specially cut from steel drop

forgings. The main shafts are all six-spline and the pilots are carried in roller bearings. The shaft bearings of the 3000 and 4000 pound trucks are SKF annular ball self-aligning type, and the larger sizes are mounted on New Departure annular bearings, double row for the main shafts and single row for the countershafts. On the right side of each gearset case is a larger filler for replenishing the lubricant, and by removing the plugs the level of the grease can be seen. To fill the case with grease only removal of the plug is necessary. In other constructions the floor of the body must be taken up to reach the case, and the cover must be removed before the lubricant can be replenished.

The dashes of all Federal trucks are formed of steel, so pressed that there are slides extending to the seats, dropping sharply from the tops and having sufficient height above the footboards to prevent articles from being shaken from it. The edge of the dashes and the slides are heavily capped, the cap being formed integral with the unit, which reinforcement insures against bending should it be struck with considerable violence, and yet adds very little to the weight.

Concord Driving Shaft Supports.

The driving shafts of the Concord trucks are in two sections with three universal joints, and the rear end of the forward section is carried in a self-aligning annular ball bearing mounted in the web of a frame cross member. The center section of this member is very wide, the upper line being straight and the lower line being an arc with the least width at the ends. The member is pressed steel and the top and bottom webs are wide. It is hot riveted to heavy gussets and these are similarly retained to the side members, the assembly affording exceptional strength and great rigidity with comparatively light weight. The pull rods of the brake linkage pass through holes at either side of the bearing mounting and at all times the draw upon them is direct.

Sterling Offset Lamp Brackets.

One of the interesting fittings of Sterling trucks is the head lamp brackets, which are steel drop forgings of large size. The lamp is carried in a fork or yoke, from which the body of the forging extends diagonally to an end that has the same plane as the yoke, the purpose being to bolt the end or seat of the bracket to the frame side member at right angle to the webs just back of the spring horn and offset the lamp sufficiently ahead of the radiator to insure against contact with it or the fenders. The bracket is secured to the frame with two bolts that may be quickly reached whenever there is need of removing the lamp for work on the radiator, power plant or for repair.

The Federal Motor Truck Co., Detroit, has appointed L. A. Closter of Chicago district sales manager for Michigan, Indiana, Kentucky, West Virginia and Western Pennsylvania.

WANTS SYSTEMATIC HAULAGE.

The English government has plans making for the development of systematic haulage on highways and the proposition has been placed before the Board of Trade and the War Cabinet with the result that the organization of a Road Transport Board was authorized, the members to be appointed by the president of the board of trade with the concurrent approval of the war cabinet.

The new body will consist of representatives from the War Office, the Ministry of Munitions, the Ministry of Food and the Board of Trade, and the purpose is to coordinate commercial and military haulage necessities so that the needs of either can be utilized to the greatest possible degree without retardation, no matter what the conditions or requirements.

WILL CONTINUE RUSH TRUCKS.

The stock and materials of the Rush Motor Truck Co., Philadelphia, has been sold by the receiver appointed to realize on the assets, and these have been acquired by the Rush Motors Corporation, which has been formed to continue the manufacture of Rush trucks and to sell parts and afford service to owners of Rush equipment. The company has leased a building formerly used by the Bourne Magnetic Truck Co. in Philadelphia and has begun operations.

NEW SANFORD TRUCK DEALERS.

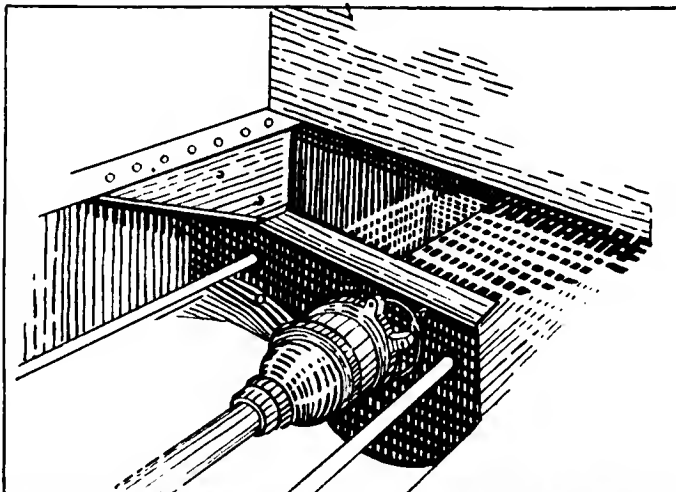
Agency contracts have been made by the Sanford Motor Truck Co., Syracuse, N. Y., with W. Cady Smith, Schenectady, N. Y.; R. E. Lent, Ossining, N. Y.; Oswego County Auto Co., Oswego, N. Y.; J. A. Morris, New Haven, Conn.; L. S. Hall Rubber Co., Philadelphia, Pa.; Foley Motor Co., Newark, N. J.; Lawrence Motor Sales Corporation, New York, N. Y., and R. V. Jones, Kansas City, Mo.

The Standard Motor Truck Co., Detroit, has appointed E. W. Dobson, formerly with the Hercules Motor Manufacturing Co., the Continental Motors Corporation and the truck department of the Packard Motor Car Co., its factory manager.

The Moon Auto Co., Dallas, Tex., and the Jackson Motors Co., Denver, Col., have made agency contracts to sell Muskegon trucks, the former for Northeastern Texas and the latter for Colorado, New Mexico and Eastern Wyoming.

The factory of the Niles Car and Manufacturing Co., Niles, O., has been purchased by the Niles Motor Truck Co., Pittsburgh, Pa., which will continue the manufacture of trucks under the name of Niles.

New York City's street cleaning department has ordered 32 tractor flushing machines, which will be used practically the year through, for flushing the streets and removing snow.



Central Cross Frame Member of Concord Trucks, Carrying the Rear End of the Forward Section of the Driving Shaft in a Self-Aligning Bearing.

Red Cross Service with Trucks in France

Few Americans who read of the army operations in France realize what uses are made of power trucks by the American Red Cross, although with rare exceptions all readers understand that without power trucks the armies would be dependent upon railroads or animal vehicles and movements would be enormously retarded. The American Red Cross has in its organization in France alone no less than 634 trucks and cars of varying capacities, which not only handle an average of 2500 tons of freight monthly at 14 different ports, but move nearly



Practical Possibilities for Road Work with Machine Equipment—Kinsell Truck Dragging an Eight-Foot Grader.

1000 tons a week from Paris stations and landings on the River Seine, and haul supplies, workers, refugees and wounded in all parts of France, not excepting localities that are under shell fire.

Should a hospital wire suddenly that it requires emergency supplies and a car or a truck can make faster time than a train, the load is sent with a Red Cross driver. If a German attack threatens a village, Red Cross trucks move the citizens and their property to places of safety or to refugee trains awaiting at distant stations. The ambulances may convey wounded soldiers to base hospitals or respond to a call to remove wounded after a bombing raid.

At times the trucks, ambulances and cars are used as passenger vehicles. In Paris alone in two months they responded to 2528 calls to move people, many of them refugees who were taken from one railroad station to another. In one week the machines made 233 calls in the city, 130 calls outside of the city and 47 were sent near the army lines for prolonged service.

The fleet of vehicles is composed of 386 trucks and ambulances, 246 passenger cars and 22 motorcycles. To operate these machines the Red Cross maintains two large garages and an automobile park in Paris. The other needs are served at ports and elsewhere by 15 other garages. At the chief garage is a complete machine shop manned by a

force of skilled mechanics.

Moving supplies rapidly is imperative and the Red Cross drivers are proud of removing 300 tons of freight from one port landing in a single day, and another work that was done with great rapidity was handling a cargo of 38,000 cases weighing 980 tons. On the freight platform at Paris 15,000 cases can be stored at one time. More than 80 per cent. of the Red Cross supplies must pass through the French capital and practically every article shipped via the Red Cross from America, whether a baby's sock, a case of bandages or a complete hospital equipment, is handled at some point by one of the vehicles of the fleet.

RAINIER TRUCK AGENCIES.

The following agencies have been made for the distribution of Rainier trucks: Lyon-Day Motor Truck Co.,

TRUCK WORK AT NEW NATIONAL POWDER PLANT.

The War Department is building a large plant that will be known as Nitro, near Charleston, W. Va., at which, when operated to capacity, about 18,000 persons will be employed. The construction is now being rushed as rapidly as possible and if all goes well the building work should be completed in less than a year. In preparation for the erection work a large railroad yard is being built, into which all building material will be shipped, and thence distributed to the locations for the various units of the plant. Besides the shops there will be barracks and houses for the workers, all of which must be erected.

A contract for the truck haulage has been made with George H. Pride, president of the Heavy Haulage Co., New York City, a member of the Highways Transport Committee of the Council of National Defense, who is now operating 50 two and five-ton Pierce-Arrow trucks in this work, and there is probability that this number will be considerably increased. The machines are used for both excavation and transfer work in the reservation.

TRACTOR TRAIN SERVICE.

Regular service between Detroit and Toledo, O., operating trains, each consisting of a Walter tractor and two five-ton trailers, has been begun by a company of which Jesse D. Hurlburt is president,



Three Federal Three-Ton Trucks, Each Carrying a Smaller Chassis, Driven Overland from Detroit to the Agent at Albany, N. Y.

Lexington, Ky.; Harrisburg Welding & Brasing Co., Harrisburg, Pa.; Tremblay & Hathaway, Springfield, Mass.; W. W. Barnett, Denver, Col.; Farm Truck and Tractor Co., Scranton, Pa.; Veitch-Hall Motor Co., Newark, N. J.; Takamine Laboratories, Tokio, Japan; H. Parker Wood, Cape Town, South Africa; Stellar Motor Co., Pittsburgh, Pa.; Seitz Auto Co., Baltimore, Md.

Gasoline fuel tanks, fenders, hoods and different specialties are manufactured by the Western Metal Specialty Co., Milwaukee, Wis.

The Denby Motor Truck Co., Detroit, has appointed C. C. Thomas a sales engineer.

Frank C. Schmidt vice president and general manager, and Frank L. Baird secretary, two trains leaving each city daily. The office of the company is at Toledo, but offices and a warehouse will be established at 3610-18 Detroit avenue, which property has been leased and is now being adapted for the general requirements of the service.

Thus far freights to Toledo have been largely for concerns operating in the automotive industry and have generally been to capacity, but freights to Detroit have been comparatively small. Because of a detour due to road construction at Monroe, Mich., the time for the trips is approximately nine hours, but this will be reduced to six hours with the completion of the highway work.

SEMI-TRAILER AEROPLANE CARRIER.

A special tractor and semi-trailer unit has been designed for transporting aeroplanes by highway whenever there is need for hauling instead of flight. Flying is not always practical, and in the event of damage repair might be made to better advantage elsewhere. Should flying become a sport more generally engaged in the use of highway vehicles to carry the planes is by no means visionary.

A special equipment for carrying aircraft that has much to recommend it is a Fruehauf semi-trailer drawn by an Acason light tractor for the weight of the freight would not require unusual power. The semi-trailer body is of ex-

anticipate commercial airplane building, an industry that is believed will be aggressively entered into by Detroiters now engaged in automotive production.

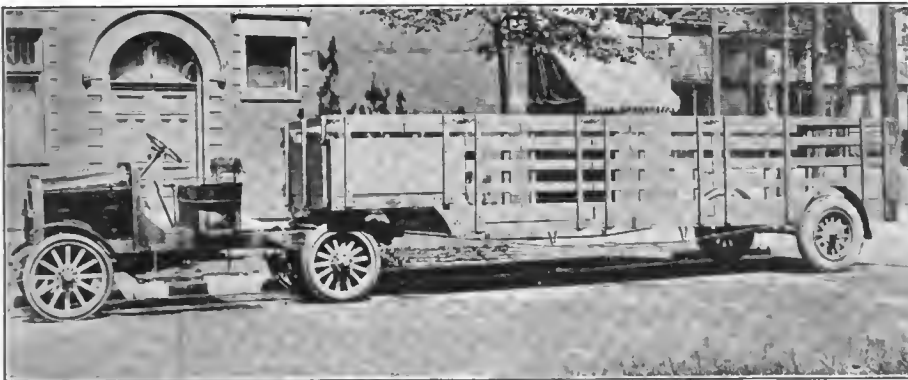
NEW KISSELKAR AGENCIES.

Agencies for sale of KisselKar cars and trucks have been placed with the following: Charles Gehrke, Glasco, Kan.; Herbert H. Smith, Waitfield, Vt.; Charles Barre, Pawtucket, R. I.; R. B. Jones, Limon, Col.; A. C. Gillet, Fort Morgan, Col.; A. P. Jackson, Casper, Wyo.; Miller Bros. & Co., Lamar, Col.; Brownell Auto Co., Birmingham, Ala.; Mutual Auto Co., Dothan, Ala.; Burk Auto Co., Decatur, Ala.; W. R. Reed, Tuscaloosa, Ala.; John M. Summers, Russellville, Ala.; L. V. Sadler, Camden,

HEAVY HAULAGE DELIVERY OF PACKARD TRUCKS.

All builders of power trucks will affirm that they are adapted for heavy haulage, but few will demonstrate this more effectively than did the Packard Motor Car Co., which recently sent one of its largest trucks to a dealer in a distant city freighted with another large machine. Carrying one truck chassis on another is not an uncommon undertaking when the two are considerably different in size, but the unusual fact of this particular delivery was that the smallest truck was so large that it was equipped with a hydraulic hoist and a steel dumping body.

Of course the carrying truck was stripped and fitted with special blocking and bolsters on the frame, and the carried truck was jacked and then securely "nested" on the blocks and bolsters. By placing the spring horns of the smaller truck at either side of the cab and the front axle close to the back of the seat, and with a frame to support the load directly above the rear axle of the large machine, a satisfactory balance or equalization of the load was obtained. When the loading was completed the trucks were practically one unit, so well had the work of freighting been done. The delivery was made without incident, but there is reason to believe that considerable ingenuity was necessary to unload the small truck. So successful was the



Acason Light Tractor with Fruehauf Trailer Specially Designed for the Transportation of Aeroplanes by Highway.

ceptional interest. The design is simple, but differs considerably from those used for freighting, for large platform space is necessary. The trailer is 25 feet long and seven feet wide, with two levels of the deck, about five and a half feet of the platform being about 12 inches higher than the remainder, the frame being "goose-necked" or cut under above the rear end of the tractor chassis. This construction is such that the decks of the trailer are level and under the deck of the forward end is the turntable that is carried on the rear end of the tractor.

The frame is strongly built, though comparatively light, being reinforced with plates of angle steel and gussets, and trusses extend the full length of the body under the side members. The platform is enclosed with racks 48 inches high, the lower ends of the stanchions being in steel sockets riveted to the frame. There is a substantial tail gate. The sides can be removed when there is need of having a clear platform. The trailer is mounted on a heavy steel dead axle and springs. The wheels are shod with Goodyear 36 by seven-inch "all weather" pneumatic tires, and there are solid tires on the tractor. Fenders above the trailer wheels protect the airplane from splashing water or mud. The trailer is rated at 6000 pounds load capacity.

The outfit is well thought out. There is belief that it will be in demand during the commercialized use of airplanes which will follow the cessation of war. The unit has been commented favorably on by those who have examined it and



Packard Truck Driven from the Detroit Factory to the Agent, Carrying a Smaller Machine Equipped with Hydraulic Hoist and Dump Body.

Ala.; Thomas Sales Co., Jasper, Ala.; Shirley & Bailey, Aliceville, Ala.; Elliott Motor Co., Gadsden, Ala.; G. H. Scroggin, Broken Bow, Okla.; Ranger Auto and Supply Co., Ranger, Tex.; D. A. Bradshaw, Grand Prairie, Tex.

By leasing a floor of a four-story building in East 46th street, Cleveland, O., the Marvel Accessories Manufacturing Co. has increased the floor space available for manufacturing by 15,000 square feet.

The General Motors Truck Co. has appointed John McKeough sales manager for Chicago and the section adjacent to that city served by its branch.

The Federal Motor Truck Co., Detroit, has made J. G. McHugh a special factory representative.

experiment that it will probably be repeated.

C. H. Chenevert, who was vice president of the Denby Motor Truck Co., Detroit, has been commissioned senior lieutenant in the Bureau of Aviation Operation and will serve in France.

The Master truck department of the Larson-Oldsmobile Co., Philadelphia, has been placed in charge of M. F. Luckenbill, formerly of the Packard Motor Car Co., as sales manager.

A commission as major in the Quartermaster Corps, U. S. A., has been issued to N. E. Wahlberg, who was chief engineer of the Nash Motors Co., Kenosha, Wis.

Garage and Service Station Machinery, Tools and Equipment

The Stow Electric Buffer was originally designed for buffing the bright surfaces of automobiles, but has many uses around the garage or machine shop. The outfit consists of an electric motor, which may be had to operate upon any voltage or cycle, direct or alternating current, direct from a lamp socket; a flexible shaft, clamp spindle and connections, also one 3x1-inch buff and one 4x1-inch buff. In addition to its usefulness as a buffing device for shining brass and metal work, it may be used with small grinding wheels as well. The small size machine takes wheels up to and including 2½x4¼ inches, while still heavier machines take wheels up to and including 4x4¼ inches.

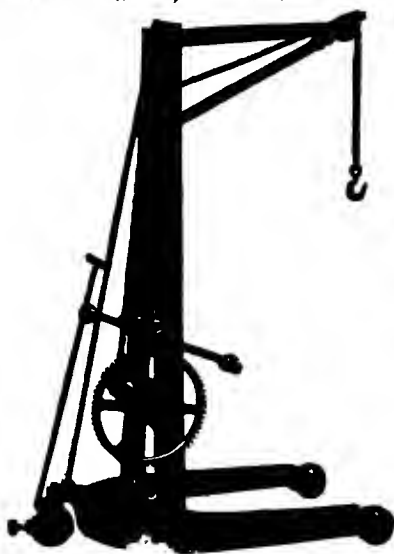
Manufactured by Stow Manufacturing Co., Birmingham, N. Y.



Stow Electric Buffer.

The Portable Floor Crane has many uses and the saving of time accomplished by its employment make it almost invaluable where much automobile or machine work is done. The crane illustrated is made of steel with a cast iron base. Standard cranes are made in a number of sizes and have capacities ranging from one to two tons with lifts from 6½ to 9½ feet according to size. The length of overhang is 30, 34 or 36 inches.

Manufactured by the United Engine and Manufacturing Co., Hanover, Pa.



Portable Floor Crane.



Continental Motor Stand.

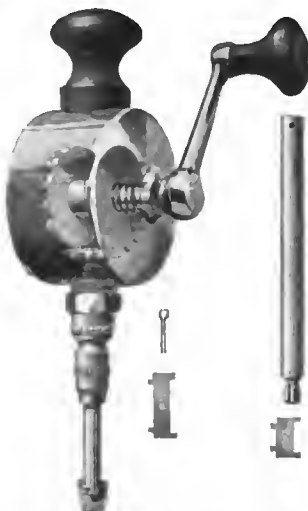
The Continental Motor Stand is universal handling the Ford engine or any three-point suspension engine from any kind of a passenger car, truck or tractor. The stand is portable and can be moved to adjust the engine in any position desired.

The engine is fitted to the stand in the same position that it is fitted to the chassis and all bolts and clamps necessary are furnished as complete equipment with the stand. It is adjustable in width from nothing to 30 inches. Has a five-inch adjustment in height and can be locked in over 25 different positions.

Manufactured by the Continental Auto Parts Co., Knightstown, Ind.

The Sioux Valve Grinder consists of a handle or crank operated wheel which drives through suitable gears the grinding tool. The gears are so arranged that by a continuous turn of the crank the tool is given a reciprocating motion, always traveling slightly forward in one direction, then in the opposite, until the whole circumference has been made. With the tool are furnished three special valve head fittings and a special length of shaft for extension purposes.

Manufactured by Albertson & Co., Sioux City, Ia. Price \$6.



Sioux Valve Grinder.

The Schmidt Cylinder Grinding Machine is designed for grinding gasoline engine cylinders from the smallest motorcycle type to a six-cylinder block 21½ inches long. The base is of the cabinet type and designed to eliminate all possible vibration. The boring spindle, which is designed for strength and rigidity, is six inches in diameter by 12 inches long and carried upon heavy bearings. The face plate upon which the cylinder block is mounted while being ground is large and heavy, and has both a cross and lengthwise feed, the latter being automatic. It is also fitted with two knurled nuts by which the plate may be raised and lowered, thus facilitating the centering of the cylinder. The length of the bed is 55 inches and the width 15¼ inches. The height from the bed to the centre of the spindle is 12 inches.

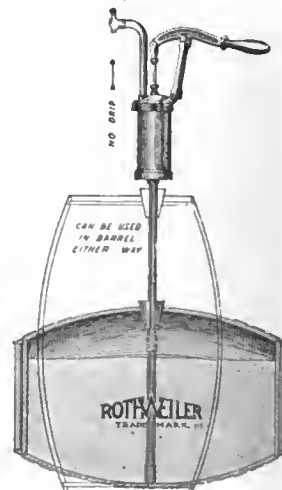
Manufactured by the B. L. Schmidt Co., Davenport, Ia.



Schmidt Cylinder Grinding Machine.

The Rothweller Pump effects a saving of oil and greater efficiency in handling lubricants for the motor car. This device consists of a pump which delivers a full quart of oil at each stroke, equipped with a type of spout designed to eliminate dripping, mounted on a long suction pipe, which will reach to the bottom of an ordinary oil barrel standing on end. The suction pipe is fitted with a tapered plug and with this feature can be used in the barrel either from the end or side.

Manufactured by Rothweller & Co., First So., at Hanford St., Seattle, Wash.



Rothweller Pump.

The **Stenman Electric Valve Grinder**, recently placed upon the market, is designed to save labor in valve grinding, and it will handle truck, tractor, aeroplane, marine or stationary internal combustion engine valves. This machine will operate from either direct or alternating current and can also be operated from any standard lighting circuit. Any valve can be reground in either the L, T or I head construction and the valve seat renewed in from three to five minutes as compared with from 15 to 20 minutes required with hand tools. It is now being used by the government at Camp Devens, at various aviation fields and by such concerns as the United States Steel Co., the Western Electric and Standard Oil companies and numerous garages throughout New England and New York state. It is thoroughly practical for any size establishment.

Manufactured by the **Stenman Electric Valve Grinder Co., Inc.**, 42 Southbridge St., Worcester, Mass.

The **E. & S. Power Hack Saw** is a high speed machine with a sawing capacity of 4 by 4 inches. The saw arm takes a nine-inch blade and is driven by a crank working between V bearings and is equipped with a sliding weight to regulate the pressure to secure the best results from the saw blade. It has an automatic stop and is driven by a 2x10 crown pulley, or a crank can be furnished for hand driving.

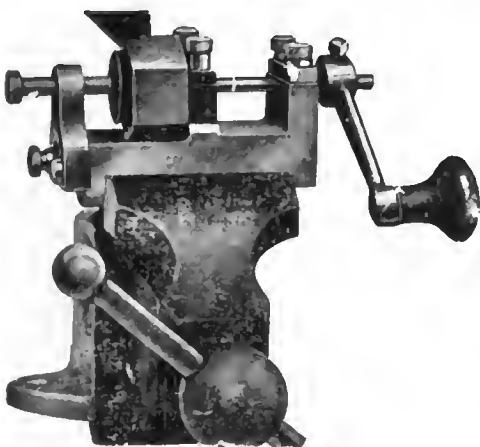
Manufactured by **Ellis-Smith Manufacturing Co., Inc.**, 216 Niagara St., Buffalo, N. Y. Price, \$18.

The **Johanna Electric Grinding and Buffing Tool** is operated by a self-enclosed motor, with all its working parts enclosed in a dirt proof casing. The motor may be had in a number of windings at speeds of either 1800 or 3600 revolutions per minute. For garage work the arbors may be fitted with two grades of emery wheels; for tire vulcanizers a buffer and grinding wheel. The manufacturers claim the machine is pleasing in appearance, both easy running and silent in operation. The illustration shows the machine upon a standard mounting, but the grinder unit may be purchased or used separately.

Manufactured by the **U. S. Electric Mfg. Co.**, 459 E. Third St., Los Angeles, Cal.

The **Sioux Refacing Tool** is designed for refacing valves and will reface any valve of standard type, that is, with 45 degree face and up to three inches in diameter. For valves of 30 or 60 degree faces extra cutters are obtainable. The cutters are made of tool steel, hardened, tempered and cut to the correct angle. The manufacturer claims that no experience is necessary for operating the tool and that finished jobs are obtainable in a surprisingly short time, even by inexperienced men.

Manufactured by **Albertson & Co.**, Sioux City, Ia. Price, \$6 with one 45 degree cutter; extra cutters, 75 cents each.



The Sioux Refacing Tool.



Stenman Electric Valve Grinder.



E. & S. Power Hack Saw.



The Babbitt for Ford Cars.



Johanna Electric Grinding, Buffing Tool.

The **Babbitt for Ford Cars** is especially designed to re-babbitt Ford connecting rods, quickly, economically, accurately and in a serviceable manner. Ford parts are standardized, so that the mandrel of this tool could be made so that it would cast the bearing to the thousandths part of an inch, ready to fit the crankshaft for the usual "burning in" process. After the metal is cast and hardened the top of the mandrel is struck a blow with a hammer to disassemble the parts and a few strokes of a rough file is all that is necessary to finish the rod for the engine. This device will babbitt Ford connecting rods at the rate of three to four an hour and at a saving of \$1.75 to \$2.50 on a set of four connecting rods.

Manufactured by the **Burlington Machine Works, Burlington, Ia.** Price, \$15. Shipping weight eight pounds.

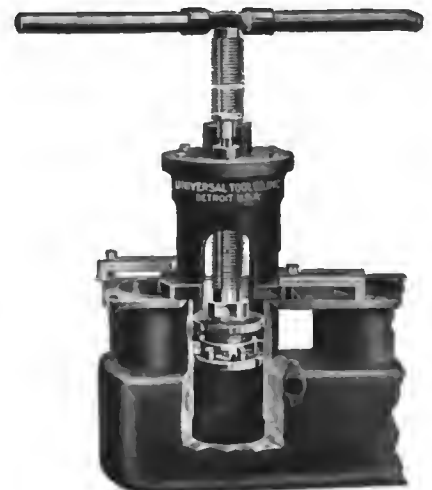
Laminum.

Laminum consists of a number of sheets of brass .002 or .003 of an inch in thickness, firmly held together by a metallic binder. The appearance is that of a solid piece, yet each sheet may be peeled off, leaving the thickness slightly less than before. It may be purchased in sheets to be cut to any size, or made up into the shape of bearing shims. After the leaf has been peeled off the resulting surface is said to be absolutely smooth, without grain or grit of any kind. The advantages claimed for this type of shimming material are that it is solid, offering no surface for grit to adhere to and that necessary adjustment may be obtained without filing, leaving the surface smooth and free.

Manufactured by **Laminated Shim Co., Inc.**, Canal St., New York, N. Y.

The **Universal Cylinder Reboring Tool** is simple in design and effective in action. The cutter head has six cutter surfaces that are adjustable in unison. A bevel expansion ring is fitted into the cylinder which is to be rebored and the bevel pilot head acts as a centralizing device. There is also an oversized securing ring, which follows the new cut, thus insuring an absolute rigid tool and perfect central device. This tool is intended to be used either by hand or under a drill press and on detachable head cylinders the reboring can be done without removing the cylinder block from the car. The operator can set the cutters at any desired size within one-half of one-thousandth of an inch, enabling him to rebore the cylinder in one operation to fit pistons already made regardless of the oversize of the pistons. The value of this tool in a service station or repair shop is largely in that it is available at any time without power and the adjustments for work can be made without chance of error.

Manufactured by the **Universal Tool Co.**, Detroit, Mich. Write for prices and literature, Detroit, Mich.



Universal Cylinder Reboring Tool.

HIGHWAY REPAIRS IMPERATIVE

Systematic Restoration of Roads Must Be Begun or Plans for Truck Freightage Will Be Futile and Winter Will Stagnate Industry

MAINTENANCE of existing highways is one of the most important war problems the people must deal with.

Successful prosecution of the German war depends in very large part upon how much freightage can be diverted from railroads to highways.

This condition is not exaggerated. If there were criticism of the statement this would be that there was not sufficient emphasis of the necessity—that the people cannot understand how vital is the need of road haulage nor comprehend results that may follow unless a definite policy shall be established and sufficient resources placed at the disposal of an unhampered and impartial administration.

First of all there are salient facts that are worthy of consideration—that should be regarded from two aspects only—**PATRIOTISM and BUSINESS.**

Patriotism means placing needs of the nation first of all, to make sacrifice willingly and to any extent the needs of the country seemingly demand.

Business must be continued so far as is possible that we shall have the resources to continue the war so long as warfare is essential to a world's peace, and to preserve industry and commerce so that following the war we shall not suffer stagnation because of competition of nations in trade.

Enormous Mileage of Roads.

With reference to the highway conditions of the country. The United States has enormous area. Exclusive of city, town and village streets it has upwards of 2,500,000 miles of highways, and in addition there is a very large mileage of what may be regarded as vehicle paths or roads, that have not been accepted by communities for the simple reason that acceptance of them means assuming responsibility for their condition and the expense of maintaining them. Of the 2,500,000 miles approximately 10 per cent. is what is known as improved.

Since the days when bicycling became popular the people have understood the roads of the nation as a whole are poor. Beginning with the utilization of automobiles there has been a demand that roads be improved. The betterment of highways became to some extent a political proposition, there being objection by taxpayers generally to paying for what they believed to be unnecessary expense. By this is meant that bicyclists and motorists and others demanded better roads on the broad principle that the public, which generally benefited from improvement, should pay for it. At the other hand taxpayers as a rule objected on the ground that taxes should be minimized and that those who wanted the roads should pay for them.

Only State Policies Adopted.

Not until a score of years ago did the states undertake highway construction to standards. There never was any well defined object in any state policy other than to have roads between commercial centres, although most of the states have undertaken to plan what are known as highway systems. Generally existing highways have been placed under state administration and improved, and some commonwealths have connected these so that there are main channels for vehicular traffic through them with connecting roads to cities and towns of importance.

The construction of these systems has been promoted by motoring bodies generally, and occasionally by commercial and industrial organizations, but in no instance has there been governmental direction or cooperation in construction. As a matter of fact there was about the same attention given to national needs as there was to army and navy preparedness. This applies to all parties and to all administrations alike. To indicate to what extent this neglect obtained and how little possibilities were considered, one may point out that the Roman Empire, more than 20 centuries ago, constructed systems of military roads in all its possessions. As early as 1755 the French began to build roads for both military and commercial purposes, and later this policy was imitated by Germany.

Political Expediency a Retardation.

From the viewpoint of political expediency refusal by Congress to undertake the building and maintenance of roads may have been justified. There was sublime faith in the existing means for transportation, which were believed to have sufficient elasticity to meet all needs. The economic value of roads were assumed to apply locally and to inaugurate road building would seemingly lead to indeterminable demands and enormous expense that could be avoided by regarding the subject as one that should be dealt with by the states.

Not until after the beginning of war by Germany in 1914 was tonnage offered the railroads that was constantly in excess of their facilities for transportation. There had been periods when the railroads were congested—perhaps to considerable extent—but these were not serious. Business was inconvenienced and all that, but there were no consequences of a character that could not be effectually dealt with. But the demands upon industry for filling war orders by the Allied nations were in addition to normal and were not only constant, but increasing.

But even then the situation was not so vitally important. It was in the hands of the railroads and they were operated each to meet so far as possible the needs

of the different sections of the country. Only when the general means of transportation were so stagnated that some industrial needs could not be met did business men begin the use of power trucks for shipments for comparatively long distances.

Increase of Power Trucks.

Without discussing the perfection and the use of power trucks for highway haulage, statement may be interpolated that at the beginning of the European war there was perhaps 100,000 machines that might be included in this classification and perhaps 25,000 converted car chassis used for freightage. At the time of declaration of war with Germany the power trucks had been increased to approximately 300,000 and the number of converted chassis to 75,000, and now these totals may be conservatively estimated to be about 400,000 and 100,000.

Prior to the declaration of war Congress made appropriation of \$85,000,000 for road construction in the different states, expendable in allotments of \$25,000,000 the first year and \$10,000,000 a year thereafter, conditional upon each state appropriating an equal amount for highway building. There was no policy or plan specified in the appropriation bill and assumedly the states were then and are now at liberty to expend the Federal appropriation wherever the state officials wish construction.

The number of automobile vehicles built in the last five years will possibly total 3,000,000. In 1917 the new vehicle total was approximately 1,800,000. This means an enormous increase in traffic, if determined on the basis of mileage, on all the roads of the country. This traffic means wear. Only a part of the roads classified as improved have been built to endure heavy travel. The result is that the roads are worn fast and because they are not repaired the neglect is evident.

Road Wear and Road Damage.

The ideas of men who are seemingly well balanced mentally with reference to road wear is surprising. They talk of "road damage" when they mean road wear, conveying an entirely erroneous impression upon those who apparently cannot think for themselves. Roads are built for vehicle traffic, not for ornamentation of city or country. Only the economy of baulage justifies the expense to the public. Traffic always increases on good roads because the poorer highways are abandoned. Road wear is dependent upon the character of construction, and, broadly speaking, in ratio to the volume of traffic.

In any event power truck use is with rare exceptions to serve business. There is very little if any pleasure found in truck motoring. This being so the wear of highways by trucks is not damage in

the sense of unnecessary wear or use of these vehicles. Primarily, trucks are used for business purposes and when business benefits directly the people also are benefited. If roads are not built to endure large traffic, if they are poorly constructed, if they are not maintained, that is no reason to condemn the use of vehicles upon them. There is the best of reason to criticize the policies, the administrations responsible for building poor roads and to direct public opinion to the wanton waste of money by continuing construction of what will be increasingly inadequate for the needs of the public and correspondingly expensive to maintain.

How Can Highways Be Maintained?

But there is neither time nor inclination to take issue with individual or party why conditions have resulted, nor is there disposition to establish responsibility. The one vitally important subject is how can the highways be maintained to endure under heavy traffic for the duration of the war. Those who would quibble or in any way evade the question are unpatriotic. They are willfully obstructing what they ought to know will best serve the nation and its people.

There is now need of action by Congress to place under the jurisdiction of a governmental authority the construction and maintenance of what may be selected as the necessary main highways of the country—that are essential to industrial and commercial activities—at least so far as these relate to the prosecution of the war. The proposition is large enough to demand the attention of an executive who can coordinate the resources of states, counties and municipalities, who can undertake what may be determined shall be necessary. The reason why Congress is specified is that state legislation could not be obtained in many instances save through special sessions of legislatures, and time would necessarily be required to unify state and local policies. There is seemingly no reason why the government could not take over certain highways on which there is interstate commerce and systematically maintain them to whatever standard shall be desirable to best endure the necessities of traffic.

Essential Road Mileage Not Large.

There are certain highways, especially those from the interior to the Atlantic shipping ports, and between various commercial centers, on which there is already heavy traffic, and there is prospect that this will be greatly increased. How great a mileage would be included in what would be determined by survey to be essential roads cannot be predicted, but the total would be very small when contrasted with the aggregate of improved highways.

The Department of Agriculture through its Office of Public Roads and the Fuel Administrator now direct the distribution of tar, asphalt and petroleum products used for road construction, upon recommendation of state highway departments, and the quantities of materials that shall be available will be dependent upon the number of cars that

can be spared by the government after the requirements for transporting coal, coke and ore shall be met.

Repairs Should Be Continuous.

There is no reason why roads should be worn until reconstruction is necessary. The repairs needed should be begun immediately and carried on continuously so long as the present conditions obtain. The cheapest and quickest method is tar surfacing of waterbound macadam, the patching of bituminous surfaced roads and insuring drainage wherever this is needed so that there shall be no destructive influences from winter storms and thawing and freezing that can be prevented.

This is a subject that vitally interests business men. The government now operates the railroads. Its needs are paramount. After these come the transportation requirements of the essential industries. The government has begun to operate principal express companies. It controls this means of shipment and assumedly the facilities have limitations. The only recourse is highway vehicles, and in whatever numbers these may be available. If trucks are necessary and practical, which cannot be denied, then the greatest utility of these is by maintaining the roads, not reconstructing them or spending large sums on small mileages, but to have them in such condition that they will be economical.

What May Compel Truck Use.

There are several main facts that should not be lost sight of. One of these is that the recent raid of submarines along the Atlantic coast may be repeated. The greater part of the coal shipments for New England are made by water. If this menace is repeated coal cannot be shipped by vessels in the same volume as has been the custom because of the necessity of convoying them. The only other means of shipping is by railroad. Such a condition implies greater use of railroad cars for coal and increasing shortage of cars for other purposes. If such a condition obtains there will be increasing use of highway vehicles in New England and in some of the Atlantic coast states. The principal highways must be maintained so that there will be no delays.

The repair of highways can best be done under one administration. The fact that the government has made appropriation to be expended jointly with states, and such expenditure should logically be made on roads used for interstate traffic, justifies the conclusion that there should be specific legislation if this shall be necessary to condition the highways that shall be essential for practical haulage.

New Jersey's Military Highways.

New Jersey has begun the construction of a system of highways with reference to military needs of the state and the country. This has been done with a report by Gen. Goethals as a foundation. It is the first state that has adopted a policy of this character. Obviously, what New Jersey has undertaken will well serve the state, but it will not be as useful as were the work a part of a national system, that will be constructed

with the view of meeting requirements for national defense and at the same time serving commercial and industrial needs fully.

The work in New Jersey is the beginning of what ought to be undertaken in all states that might be subject to attack by an enemy. Interior states may not have as essential military needs, but all will have equally necessary thoroughfares for interstate traffic. What New Jersey has engaged in all states should adopt. But while this has such merit that the attention of every state should be directed to it, the real need is to keep the highways that are now used in condition so that they will benefit the people who have paid for them.

What Economies May Obtain.

The increased fuel and lubricant used because of rough and neglected roads, to say nothing of the cost of vehicle deterioration and the value of time will add largely to operating expense. Were nothing more considered than time lost, and the price for truck service will range from \$1 to \$4 an hour, the cost of poor roads would be very great on main highways on which there was heavy traffic. But add to this the results from retardation of business and industry. The aggregate increases with astounding rapidity. The money expended for maintenance of roads may be likened to paying rent, but the money wasted because of neglected highways is as much of a direct loss as the destruction by fire of an uninsured building.

There are those who may prate of state sovereignty and the necessity of preserving state individuality, of the lack of precedent and authority in assuming control of the main highways that may be needed for vehicular transportation, but conditions exist that apply to the entire nation and not to state or localities, that can be better dealt with by the nation than by diversified interests, that must be determined without delay. There can be no criticism of what equitably protects the interests of the people.

Why Bitumen Road Work?

There is no reason for issue being taken with the suggestion that bituminous macadam is the material that will best serve for construction and repair of roads. The greater part of the highways in the eastern section of the country are macadam, either waterbound or bituminous. There are roads of other materials, but the percentage is comparatively small. The waterbound macadam can be treated with tar, the bituminous macadam can be repaired with the same material. The United States government built all the roads in and about the cantonments for troops with bituminous macadam because engineers recommended this surfacing to be the best for the requirements. There were three main factors leading to the determination—reasonable durability, quick construction and economical maintenance.

There is no desire to criticize or condemn any other highway paving or surfacing. The main desideratum is having all necessary roads available for truck

haulage at the smallest practical expense. Unless the main roads between commercial centers and the Atlantic seaports are utilized to the greatest possible degree, the business interests of the country will suffer immeasurably. Nothing will be gained by delay. Action should be taken immediately. If business men will do their part they will undoubtedly receive consideration. If they leave for others what they should do themselves they will be the chief sufferers in industrial and commercial disaster that will follow their neglect.

"GARFORD TANK" CAPTURES AUSTRALIAN CASH.

Just as the governments of the nations allied against Germany have organized their citizens into soldiery they are sys-



Garford Truck Equipped to Resemble a British Army "Tank," Used in a Campaign to Sell the Sixth English Loan Securities at Sidney, N. S. W.

tematically merging their resources for the common welfare of all peoples. In far-distant Australia the colonists have offered men and money to England as often as demands are made. But in every instance where men or money is needed the people are aroused to their responsibilities (just as they have been aroused in America), by intensive campaigns organized and directed by the leading representative of the government.

The Australians made wonderful response to the appeal for subscriptions for the Sixth War Loan, and one of the means taken to stimulate patriotic interest was the use of a Garford truck chassis, owned by Dalgety & Co., Garford distributor at Sidney, N. S. W., which was the motive power for an exact representation of a British army battle tank. So close was the tank built to the lines of the originals that it was an extremely attractive spectacle in numerous parades and demonstrations and was seen by hundreds of thousands.

In the accompanying illustration the "Garford tank" is shown in the midst of a throng in front of the Commonwealth Bank at Sidney, and with His Excellency Sir Walter Davidson, Governor of New South Wales, making an appeal to Australians to subscribe generously to the

loan and to support the government that is making great sacrifices for the entire world.

LARGE CAPACITY FURNITURE VAN.

Furniture vans driven by power are often large, but one of extreme size was recently placed in the service of Edward Allor, Detroit, which has exceptional proportions. The machine has a Union 2½-ton truck chassis, with 203-inch wheelbase, and on this was constructed a cab and van body that is 18 feet long, six feet six inches wide and seven feet height. The cab was made the width and height of the body, with a roof that curved down, with sides and a front that with the windshield fully protected the driver. The body has full panel sides and rear doors and any freight is fully

PERCIVAL IN FRANCE WITH A TANK SECTION.

Capt. Charles G. Percival, O. R. C., U. S. A., who is well known to motorists and the power vehicle industry as a driver, publicity and advertising expert, is now "Somewhere in France," and is attached to the "Tank Section" of the American Expeditionary Forces. In the accompanying illustration, made from a photograph taken abroad, Capt. Percival



Capt. Charles G. Percival, Former Publicity Expert and Driver, Serving with a Tank Section with the American Expeditionary Force in France.

appears with the overseas cap and what is known as a "Liberty Belt." Capt. Percival for more than two years was engaged in touring the United States with the Abbott-Detroit "Bulldog," and he took this machine into Alaska, it being the first ever driven in that territory. He was for several years engaged in exploits that were extremely dangerous, but his previous experiences will be tame compared with the great adventure he is now engaged in.

Having entered the service of the government, A. D. Kelley, assistant general manager of the Signal Motor Truck Co., Detroit, resigned that position June 1, but will remain in Detroit.



Union 2½-Ton Truck Chassis, with 203-Inch Wheelbase, with Van Body Built Specially for the Use of Edward Allor, Detroit.

JAPANESE USE POWER TRUCKS ON PACIFIC COAST.

Highway freightage is engaged in by men of many nationalities in the eastern sections of the United States, but rarely do people of the Orient become interested in this work. They seemingly are attracted more by commercial enterprises, and in the western states to some extent in agriculture. For this reason there is some significance attached to the activities of Japanese merchants, especially in California, who since the extreme demands have been made upon the food resources of the country have imported tea, rice, barley and other cereals in considerable quantities from Japan.

And in keeping with this is the appreciation of the possibilities of power trucks by the Kojima Co., which was organized at Los Angeles, to distribute the goods sold by Japanese concerns in that city. This company operates a large Federal truck and the machine is worked hard in general haulage in Los Angeles and its suburbs.

NORTHWAY MOTORS CORPORATION.

James F. Cavanaugh is president, Robert E. Northway vice president and chief engineer, and James F. Finneran treasurer and secretary of the Northway Motors Corporation, which has been organized with capital of \$5,000,000, and will establish a plant at Natick, Mass., for the manufacture of power trucks, tractors, engines and passenger cars.

The Stentor Electric Manufacturing Co., Long Island City N. Y., has been purchased by the Klaxon Co., Newark, N. J., which will continue the production and sale of Autophones and other telephonic instruments produced by the Stentor company, the sales being made at the office of the Klaxon Co., Hyatt building, Detroit, Mich.

A two-story manufacturing building adjacent to its present plant has been purchased by the Wisconsin Aluminum Foundry Co., Manitowoc, Wis., and removal to the new property is now being made. With new equipment and facilities production will be considerably increased.

The Standard Motor Truck Co., Detroit, has made F. X. Devlin, formerly purchasing agent of the Federal Motor Truck Co., and purchasing agent and a stockholder of the Elgin Motor Car Co., Chicago, its purchasing agent.

The Lane Motor Truck Co., Kalamazoo, Mich., is now represented in New York state and western Massachusetts by Louis W. Cossey, who was formerly connected with the Albany branch of the International Motor Co.

The Signal Motor Truck Co., Detroit, Mich., has elected F. W. Henderson President to succeed A. C. Burch, who resigned to associate himself with the Clyde Cars Co., Clyde, O.

TIMKEN-DETROIT AXLE PLANT EXPANSION.

A large addition is being erected at the main plant of the Timken-Detroit Axle Co. at Waterloo avenue and the Detroit Terminal Railway. The structure is 220 by 100 feet with a wing 160 by 60 feet, and is to be utilized as a machine shop. The cost of the building will be \$75,000, to which must be added the value of the machine equipment before it can be utilized for production.

LEWIS-HALL PLANT ADDITION.

A single story frame building 200 by 150 feet is being erected at the plant of the Lewis-Hall Iron Works, Detroit. When completed it will be used as an assembling shop. The company is now producing about 45 Hall trucks a month. It recently shipped six trucks built to government order to Fort Misslin, Pa.

SELDEN MID-WEST AGENT.

Having made contract for the agency for the distribution of Selden trucks in

SANFORD TRUCKS FOR HEAVY HAULAGE WORK.

A number of small fleets of Sanford trucks have been purchased by different concerns in Syracuse, N. Y., all of which are utilized for heavy haulage. While the number of machines owned by any one company ranges from two to four, there is in this turning from animal to power vehicle equipment a basis for the belief that the business men generally are realizing the extravagance of using horses and wasting time that might be conserved by machines and system and organization.

The Crucible Steel Co. of America bought several trucks for its Syracuse plant, and the C. L. Amos Coal Co., the J. D. Green Coal Co., Edward I. Rice and the Fred R. Peck Coal Co. all purchased similar equipment, these being 2½ and 3½-ton machines driven by worm and worm wheel. These sizes, with a five-ton chassis, make up the series produced by the Sanford Motor Truck Co., which is one of the substantial industries of Syracuse.

Previous to these sales a number of trucks had been sold to the city of Sy-



Two of the Fleet of 3½-Ton Sanford Worm Driven Trucks in the Service of the J. D. Green Coal Co., Syracuse, N. Y.

Indiana, Illinois, Wisconsin and southwestern Michigan, the Mitchell Automobile Co., 2334-6 South Michigan avenue, Chicago, has changed its name to the Mitchell-Selden Sales Co. The office of A. R. Kroh, western division sales agent for the Selden Truck Sales Co., is located in the same building as the Mitchell-Selden Sales Co.

The plant of the Ohio Electric Co. has been leased by the Doehler Die Casting Co., Brooklyn, N. Y., and a contract has been made for a 10-story building in the same city, both of which will be used by the Doehler Co.

A. C. Barberg, formerly district representative of the Willys-Overland Co., in the Chicago district, has succeeded Joseph H. McDuffy as manager of the Chicago branch of that company, the latter having resigned.

racuse and the Crucible Steel Co. had one Sanford truck in service. One reason that impelled the coal dealers to abandon horses was the difficulty experienced last winter making deliveries, and there was prospect that the conditions would be comparatively little changed during the present year at least. The practicalities and utilities of power trucks were never so well demonstrated as by the work done with them during the past winter, and during the late winter and early spring Sanford trucks were bought and placed in service to meet the demand for coal distribution. Quite logically the Syracuse business men were attracted by machines of home manufacture.

General Manager E. A. Kingsbury of the Sanford company, who has visited many northern cities the past spring, is very enthusiastic of the prospect for fleet equipments for the coming season, especially with fuel dealers.

SHIPPERS MUST USE "RETURN LOADS"

Only Movement of Freight by Trucks Will Relieve Railroads—Service Not to Cheapen Charges—Attitude of Business Threatens Disaster

CONVINCING the shippers of the possibilities of Return Loads Bureau service is believed to be the most essential factor by those who have been actively engaged in promoting the plan that has the approval of the Highways Transport Committee of the Council of National Defense. Much has been written of this plan during the past few months. Briefly, it is intended to increase productive mileage of trucks by advising shippers when trucks bound for varying destinations were available, so that these vehicles may be loaded when returning to the bases from which they are operated.

The method suggested was to have in each commercial centre an office, preferably with a board of trade, chamber of commerce or similar organization, in charge of a clerk or representative who could devote ordinary business hours to the work, who has information of record so that inquirers could be advised of shipments for other cities or towns which might be hauled. The data comprehended by the plan includes a list of all truck owners in the community or section which the bureau is expected to serve, with detail of the hours when these might be rented for differing works or trips, and record of all shipments for out-of-town destinations that might be carried by trucks that may be available for vehicles that would under ordinary conditions return unloaded.

Merits of Plan to Move Freight.

The purpose of utilizing trucks to haul freight that would normally be shipped by railroad, releasing cars and trackage for through hauls, is entirely commendable. There is no question that the railroads are burdened far in excess of what can be handled efficiently. Congestion has for many months impelled business men to use trucks for shipments for several hundred miles. One reason for congestion is that the railroads give precedence to car load freights and less than car load freights are held for indeterminate periods. Capacity loads for the largest trucks would be far smaller than the minimum that would be given immediate attention by railroads.

The comparatively small freights are not shipped until car loads for each destination can be made up, and with commodities going to all sections of the country a considerable number might not have a sufficient volume to justify shipping under the railroad regulations. When needs are urgent business men cannot wait and if express service is not available the only alternative is truck haulage. Obviously, price is not the only factor that influences shipping. In many instances whatever charge is exacted is paid without question. Delivery is all important.

Origination of Return Loads Plan.

The Return Loads Bureau idea originated in England, where it was adopted with some degree of success, and it was first tried in this country in Connecticut, the initial purpose being to obtain freights for vehicles that were sent into that state from New York City with loads that would ordinarily return unloaded. Connecticut has been more thoroughly organized than any other state, there being Return Loads Bureaus in approximately 15 cities. Outside of Connecticut the only Return Loads Bureaus in New England are at Providence and Woonsocket, R. I., which were established by the Commercial Economy Board of the Rhode Island Council of Defense. The Providence bureau was operated for two months from the Providence Chamber of Commerce, and beginning May 31 was placed in charge of E. G. Leadbetter, who for a few months was connected with the Boston-Providence Motor Trucking Co., and for 10 years was a traveling freight agent for the Lehigh Valley Railroad in southern New England. The intention of the Rhode Island Commercial Economy Board is to cover the state thoroughly and to develop an organization that will be productive of results.

Chairman Frederick W. Aldred of the Rhode Island Commercial Economy Board states that the number of calls for return loads made through the office of the master bureau, which is located at the State House at Providence, is comparatively few as yet. The bureaus established in Woonsocket and Pawtucket have not as yet been organized to a working basis, and the service may be said to be in prospect rather than reality. The Rhode Island master bureau has sent out a questionnaire to truck owners of record throughout the state to learn what vehicles may be available in the event of need.

Many Trucks Available.

The number of trucks that may be obtained is very much in excess of the requirements. Seemingly there is disposition on the part of truck owners to give whatever time their machines can be spared from regular work, but the shippers—the business men who assumedly could send freight by truck—have seemingly taken but little interest, at least not sufficient to make shipments through service that could be obtained at the bureaus.

A Return Loads Bureau was recently established by the Merchants' Association of New York City, which has been placed on a business basis and which is prepared to afford information relative to obtaining freights for trucks that could be made more productive, and this bureau is receiving a moderate number

of inquiries a day. The maximum number is not stated, but something like 25 loads a day are supplied, and this will probably be considerably increased as the service is more thoroughly organized and is better known.

Service Outside New England.

In several of the cities that are suburban to New York City, in New Jersey, in and about Philadelphia, Washington and Baltimore, Return Loads Bureaus have been organized and a reasonable measure of success has been met with, but without exception there is realization that the shippers are not interested to the degree that they should be in so vital a subject to them. This is also true of Connecticut, where bureaus have been established longer than in other sections of the country.

The managers or clerks in charge of the bureaus state that trucks are available for much more freightage than is offered, and this is attributed to the attitude of the shippers or business men, who are indeed apathetic if the reports are to be taken at their face value.

"Working on the shipper" means, if it means anything at all, that the Return Loads Bureaus must have different organization, or at least representatives who can systematically reach shippers of all classes and convince them that for their own interests that they must undertake the systematic transportation of freight by highway vehicle.

No "Patriotic Response" to Plan.

There has not as yet been what may be termed a "patriotic response" to the proposition to relieve the railroads through the operation of trucks to the plan of Return Loads Bureau. Outside of Rhode Island, Connecticut, small sections of New York and Pennsylvania and parts of New Jersey, Delaware, Maryland and Virginia the bureaus established have been very few. A great deal of publicity has been given by trade publications and by some of the newspapers. The Highways Transport Committee has sought the cooperation of the National Automobile Chamber of Commerce, and various commercial associations, but there has been nothing like the response that was made to different campaigns that were not more important nor more essential than affording all the relief possible for the railroads.

No reason obtains on which to base belief that there will be diminution of railroad freightage. To the contrary, there is every indication that the tonnage offered will be increased, and this will be considerably larger than at present in the eastern section of the country because of the need of transporting coal. The increase of 25 per cent. in freight rates allowed by Director-General McAdoo on top of the 15 per cent. increase

allowed by the Interstate Commerce Commission will mean that transportation will be very much more costly, although this will not in the least affect the demands of business.

Must Interest Business Men.

Seemingly results can only be obtained by systematic solicitation and canvassing of the commercial and industrial concerns of each community, which can only be done by men of activity and experience who will be able to convince executives of the possibilities of service, and this work must be carried on in every community of size. But there must be as well organization that will have available whenever wanted whatever equipment is necessary to make shipments. Unless trucks are readily obtainable when wanted no service can be regarded as dependable or adequate and there must be such elasticity that demands much exceeding normal requirements can be met whenever occasion arises.

Any propositions made to shippers, however, must be made on the basis of dependable service, and following this the next consideration is the matter of rates that shall be paid. There is no question that if the shippers are willing to pay satisfactory prices for service they will be able to obtain all vehicles needed, so after all rates must be the actual base for haulage from the viewpoint of the truck men. The Highway Transport Committee is not necessarily concerned in rates. What is wanted is relief of the railroads. Business men want freight hauled so that commercial transactions shall not be retarded nor interrupted. If the railroads cannot haul all the freight offered then the excess must be moved by road vehicle.

Must Have Maximum Rates.

If time is a factor, and usually it is, the business man who wants freight that cannot be moved by railroad is willing to pay whatever price is necessary, but naturally wants the lowest rate that can be obtained. This condition establishes competition with those engaged in haulage. Those who have machines idle may be willing to do work at times for whatever may be offered, at least for prices that might not be accepted by other contractors. Railroad and express rates are established and are known. They are not flexible, but apply alike to all shippers of given tonnage and classification. In addition to these are the terminal costs, haulage, demurrage, etc., all of which are obviated by direct movement from one place to another.

For the reason that railroad freight charges do not include haulage to and from terminals and the service is subject to varying delays, these ought not to be regarded as a basis for establishing trucking rates. Express charges are more nearly equal, provided that these include haulage to and from the terminals, but these do not insure against delays. Considering the direct delivery the truck owner can consistently expect, and the shipper should be willing to pay for truck transportation what is a fair price and what will insure to truck men a reasonable profit for the work.

Lack a Basis for Fair Rates.

Rates should be based primarily on what might be regarded as a service charge, which would cover overhead costs, and a flat price a mile which would cover operating cost and time, although these might be combined in a flat charge by the hour or mile. The hourly charge would apply when the idle time was large and the mileage small, and the mile charge when loading and unloading was quickly done and the idle time was relatively low.

The Rhode Island Return Loads Bureau has sought to bring the shippers and the truck owners together by conference with the truck men to determine what service they could give, and a committee has been appointed which is to determine what will be maximum charges for work with different size truck units, based either on time or mileage, so that the bureau can give to shippers approximate prices.

The experience of the bureau has been that shippers want to know whether the truck men are responsible, can afford reliable service, and what prices must be paid before they will give serious consideration to solicitation. Representations to them must be based on business principles unless they are forced by extreme conditions to pay prices in excess of what they believe they are justified in paying, the standard of measurement being railroad or express rates or previous service.

Shippers Can Furnish Freights.

While statement cannot be made that will reflect the conditions with reference to all established bureaus, there is no doubt whatever from the reports made by the Highways Transport Committee that the shippers must be interested in truck transportation if the railroads are to be relieved of short haul shipments.

So far as the truck men themselves are concerned the main problem is the cost of operating trucks, which, unless systems of accounting that will accurately determine expense have been maintained, are not definitely known, and thus far are mere approximations. Railroads and express companies, because they have been compelled to make profit, have exact knowledge of operating cost and establish rates that are based on a reasonable return. Only when truck men can offer what may be regarded as at parity to the railroad and express service can any large volume of freight be diverted to highway haulage unless there are conditions that cannot be dealt with by other means.

Intensive Work Among Shippers.

The truck manufacturers having membership in the National Automobile Chamber of Commerce have undertaken to give the campaign to establish Return Loads Bureaus every practical assistance through their representatives in different parts of the country, and undoubtedly these endeavors will be productive of results, but to what extent they can reach the shipping executives of industrial and mercantile concerns is as yet uncertain. There is only one plan that appeals to those who have been active, and that is for intensive work, which can seem-

ly only be done by men of ability who understand transportation practically, among shippers and truck men.

Statement can be made that business men who own trucks operate them in their own work as constantly as possible. Comparatively few of them are willing to undertake additional work. Truck men, however, as a rule are anxious for all the work they can find and are not limited by time or distance or character of freights. All they want is prices that will give them a satisfactory profit. If the truck men can be assured more tonnage they will find means of transporting it—by obtaining more trucks, or working two crews, or any other means that are available. The more freight offered the less will be the demands upon the railroads and the relief will be proportionate to the highway shipments.

Highways Must Be Maintained.

With reference to any highway haulage proposition the condition of the roads is a factor that will considerably influence prices. Not more than five months remain in which roads can be repaired and made ready for winter. What the weather conditions will be cannot be anticipated, but traffic will be more or less retarded if previous winters are a basis for judgment. The business men ought to bring every influence that is practical upon the municipal, state and even national authorities to give whatever degree of attention is needed for good maintenance and to have the highways kept passable, both with reference to storms and surface conditions. Systematic repair of all through routes is necessary. There is no economy in neglect of roads that represent large investments. This is particularly true of the eastern section of the country, where the commercial centres are numerous and connected with roads, and there are main roads from the interior to the Atlantic seaports on which the truck traffic is constantly increasing.

Wherever experience has shown that drainage is needed such work should be done. Weak bridges should be strengthened. Reconstruction may not be possible, but repair is intensely practical and should be undertaken without delay. The cost is a matter of small moment compared with the needs of business and the war program of the nation.

Established Return Loads Bureaus.

The following is a partial list of the bureaus established under the plan of the Highways Transport Committee. Others have been inaugurated since the reports were made, this record being probably as of June 1, although no definite statement has been issued. From this list one understands that of the 32 bureaus of record 15 are in Connecticut and 10 in New Jersey, three in New York state and one each in Pennsylvania, Ohio, Michigan and Rhode Island.

Statement is made that other bureaus are to be opened within a comparatively short time, but in Chicago, Boston, Milwaukee, Pittsburgh, Cincinnati, Louisville, Baltimore, Washington, Rochester, Indianapolis and numerous other cities, no organizations have as yet been ef-



White Triple Combination Fire Pump That Made a Continuous Run of 60 Hours During Convention of the International Association of Fire Engineers at Chicago.

fects. The official record shows these bureaus:

Connecticut.

City, location and telephone number.
Bridgeport, Chamber of Commerce, Noble 250.
Bristol, Chamber of Commerce, 100.
Danbury, War Bureau or Chamber of Commerce, 1308.*
Greenwich, War Bureau.
Hartford, Chamber of Commerce, Charter 1856.*
Manchester, War Bureau, 489.*
Meriden, Chamber of Commerce, 242.*
Middletown, War Bureau, 1245.*
New Britain, Chamber of Commerce, 1532.*
New Haven, War Bureau.
New London, War Bureau, 1642.*
Norwalk, War Bureau, 69.*
Norwich, Chamber of Commerce, 1747.*
Stamford.
Waterbury, War Bureau, 3570.*

Michigan.

Detroit, Board of Commerce.

New Jersey.

Asbury Park, Board of Commissioners, 2100.
Carney, State Council of Defense.
Dover, Chamber of Commerce.
Garfield, Police Station.
Jersey City, Chamber of Commerce, 1110
Montgomery.
Millville, Maurice River Transportation Co., 225.
Montclair, Police Department.
New Brunswick, Home Defense League, 1784.
Newark, Motor Truck Club of New Jersey, 7945 Market.
Trenton, Chamber of Commerce, 2128.

New York State.

Buffalo, Chamber of Commerce.
New York City, Merchants' Association, Woolworth Building, 7660 Barclay.
Syracuse, Chamber of Commerce.

Ohio.

Cleveland, Chamber of Commerce.

Pennsylvania.

Philadelphia, Chamber of Commerce.

Rhode Island.

Providence, Chamber of Commerce.

*Or "Return Load."

A conference took place at New York, June 12, at which a committee consisting of J. C. Lincoln, traffic manager of the New York Merchants' Association, chairman; W. P. Watson, Philadelphia; W. A. Way, Newark, N. J.; F. E. Foster, Albany, New York State Council of Defense; R. A. Wallace, Jersey City, N. J., Chamber of Commerce; M. B. Russell, Bridgeport, Conn., Chamber of Commerce; Frederick W. Aldred, Providence, R. I., Commercial Economy Board of the Rhode Island Council of Defense; D. C. Fenner, President Motor Truck Club of America, New York City; W. S. Conning, Hartford, Conn., State Council

of Defense, and Col. Louis M. Ulman, New Haven, Conn., Chamber of Commerce, was appointed to formulate a general operating policy for return load bureaus so far as protecting the interests of shippers and truck men was concerned, suggesting rates for service, contracts and insurance forms.

This conference was presided over by C. A. Musselman of Philadelphia, representing the Highways Transport Committee, and the deliberations were at considerable length. There was general expression of the need of educating the business men of the country to the need of diverting all freightage from railroads that could be practically handled by power trucks within reasonable operating distances.

There was intimation that in the event the railroads were not sufficiently relieved by the diversion of what might be regarded as local freights the government might take control of highway transportation and operate it as it has the railroads. If there are dependable and regular services, which can be controlled by business men, the situation can be met, but there is reason to believe with the continuance of the war there is probability of even greater retardation of railroad transportation than was experienced last winter. Only united action by industry and commerce will bring about the necessary relief. This action must be taken immediately to make preparation for the winter that is to come.

WHITE FIRE PUMP MAKES NEW NON-STOP RECORD.

Exceeding by 40 hours the longest previous pumpage test, a White triple combination fire pump created more interest during the 1918 convention of the International Association of Fire Engineers at Chicago than any other event. The pump was operated for 60 hours continuously, the test being made at the municipal pier, pumping from draft under observation of the delegates and officials representing the association and the Stock Fire Insurance companies.

Until this test was made 20 hours had been regarded as a sufficient period to demonstrate the capacity and endurance of any motorized fire apparatus, but the White engine represented a new type in fire department practise, it being a 16-valve construction, and there was belief that the engineering possibilities justified close study of the machine and its work.

Claim was made for the White engine that it was remarkably free from vibration and exceptionally smooth and flexible in delivery of power. The cooperation between fire and internal combustion engine engineers has resulted in material improvement of apparatus, and because of the high efficiency developed during the 20 hours originally planned for the test, decision was made to continue the pumping.

The official statement of Chief Faxon Billings was to the effect that inspection of the pump after the test showed the machine to be in perfect condition; that examination of the gear cases and moving parts during the test showed no overheating, and that the apparatus was particularly free from vibration. Engineer E. H. Townsend of the Stock Fire Insurance companies made report that he has examined the cylinders, valves, bearings and working parts of the engine and pump after the test and found both to be in very satisfactory condition. He also certified that he had examined the engine during the 55th hour of the test and found it running satisfactorily, and that according to the pilot tube measurements the pump was delivering an average of 625 gallons a minute at a net pressure of 123 pounds a square inch.



Federal Truck Operated by the Kojima Co., a Concern Owned by Japanese, Engaged in General Haulage at Los Angeles, Cal.



Hess Bright Ball Bearings

To carry the load and stand the strain

That is the duty of axle and shaft as you see the heavy-laden truck in actual service. Within that great truck there are ball bearings that carry all the strain of the shaft and all the load of the axles—yet they have the added duty of reducing friction.

That Hess-Bright Ball Bearings serve this way under such conditions makes them standard. Rugged in strength, precise in manufacture, yet certain of performance in gruelling service. That's the testimonial of their worth to you.

THE HESS-BRIGHT MANUFACTURING COMPANY

Where Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

Hanch Is Director of Automotive Products



C. C. Hanch, Treasurer of the Studebaker Corporation, Chief of the Automotive Products Section of the War Industries Board.

The successor to H. L. Horning, who organized and directed the Automotive Products Section of the War Industries Board until he resigned to resume his work with the Waukesha Motor Co., Waukesha, Wis., is C. C. Hanch, treasurer of the Studebaker Corporation, Detroit and South Bend, Ind., secretary of the National Automobile Chamber of Commerce, formerly with the Nordyke & Marmon Co., Indianapolis, Ind., and one of the best known men in the power vehicle industry.

Mr. Hanch was asked to undertake the direction of the section, which was created for the purpose of systematizing the production and delivery of all orders by government departments, determining what concerns can afford the quickest service, supervising in general the work done and obtaining for the government whatever is required in the shortest possible time and for the least price consistent with the specified quality. In directing the activities of the section Mr. Hanch will be associated with George N. Peck, who is in charge of the Finished Products division of the board.

Mr. Hanch has wide knowledge of the industry and the resources and capacities of the concerns engaged in it, and his experience with materials and methods will no doubt be of large value in the work of the board. The choice of the War Industries Board in deciding upon Mr. Hanch has been approved by all operators in the automotive industry, and his response to the request to serve is made at no little personal sacrifice by him, and by those with whom he is associated.

SMITH ELECTED TREASURER OF SHIPPING BOARD.

The world's war is a great leveler of men and customs. Changes are made with great rapidity. Men who were comparatively unknown become prominent, often international figures, because of summons to serve the nation. And from activities that are comparatively local men are called to great undertakings, the magnitude of which would be almost incomprehensible in normal times.

An instance of an executive of a successful industry being taken from his own business and caused to assume large responsibilities is that of George T. Smith, president of the Joseph Dixon Crucible Co., Jersey City, N. J., who has been made treasurer of the United States Shipping Board of the Emergency Fleet Corporation, which is, in nearly 100 shipyards, with hundreds of thousands of workers, replacing vessels destroyed by submarine warfare that the armed forces of the United States and the resources



G. T. Smith, President, Joseph Dixon Crucible Co., Treasurer of the United States Shipping Board, Emergency Fleet Corporation.

of the nation may be available for the operations of the Allies in the battlefields of Europe.

W. E. Hutchinson, who was purchasing agent for the United States Ball Bearing Co., Chicago, has succeeded E. F. Oberlin as manager of purchases with the Denby Motor Truck Co., Detroit, Mr. Oberlin having entered the service of the government.

F. J. Kidd is now assistant treasurer and general manager of the Racine Tool and Machine Co., Racine, Wis., having resigned as secretary and treasurer of the Racine Manufacturing Co. of that city.

The Federal Motor Truck Co., Detroit, has made Arthur C. Leverton, formerly vice president of the H. L. & W. Sales and Manufacturing Co., its factory manager.

ROBERTS TIRE CO., INC.

E. S. Roberts, formerly sales manager of the truck tire department of the McGraw Tire and Rubber Co., East Palestine, O., is president and treasurer, and William C. Monks is vice president and secretary of the Roberts Tire Co., Inc., New York City, which will deal in a number of well known makes of solid and pneumatic tires suited for equipping any type of power vehicle.

KEYSTONE ABSORBS GRYPHON.

The plant of the Gryphon Tire and Rubber Co., 192nd street and Bailey avenue, New York City, has been acquired by the Keystone Tire and Rubber Co., which will operate it on a larger scale, expecting to increase the production from 200 to 500 tires a day within a short time, and to have an output of 1000 tires a day by the end of the year.

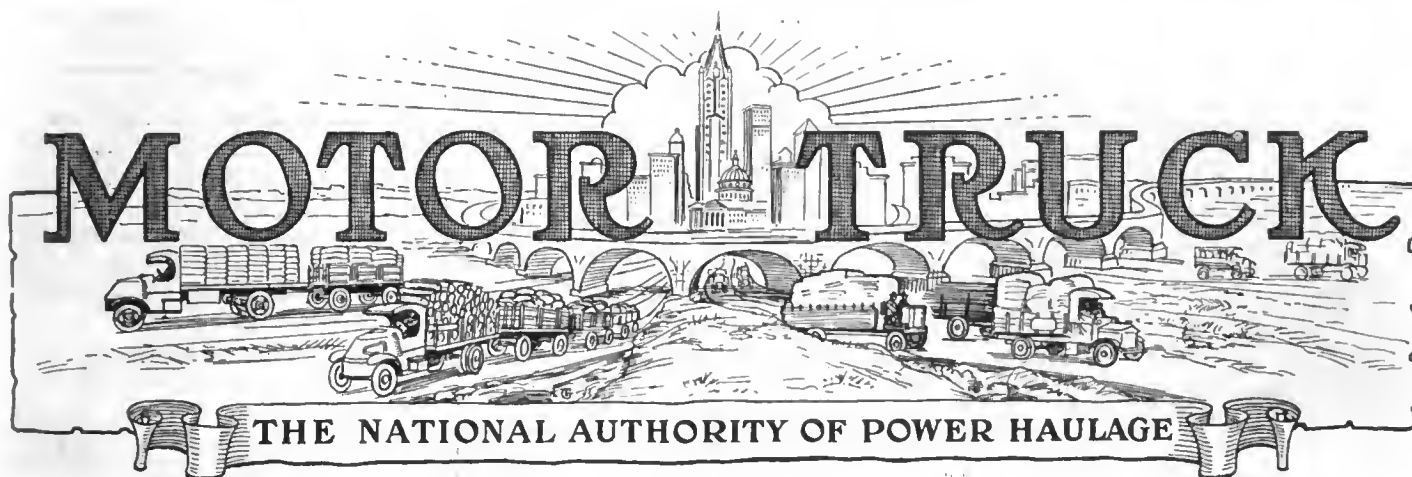
REYNOLDS REWARDED FOR HIS WORK ABROAD.

Wilbur F. Reynolds of the Selden Truck Sales Co. ought to believe in the statement that those who do their work well have responsibility thrust upon them. And the reason for this is that while he was absent from Rochester, industriously presenting the qualities of Selden trucks to the natives of other lands, the stockholders elected directors and the directors elected officers, as a result of which he became third vice president and director of foreign sales. As he was in charge of the export business



Wilbur F. Reynolds, Third Vice President, in Charge of Export Sales, Selden Truck Sales Co.

of the company while absent he found that he was responsible to himself, and now he is planning to so much exceed his own record that the production facilities of the company will again be increased. As Mr. Reynolds was abroad a year, the Selden truck is nearly as well known in other countries as it is in the United States.



Vol. IX. No. 7.

PAWTUCKET, R. I.

JULY, 1918

LONG DISTANCE TRUCKING

Callan Bros., Inc., Operate 40 Seven and One-half Ton Mack Trucks—Handle Freight Within a Radius of 400 Miles of New York City—Maintain Eight Warehouses—Wharf at Their Yards One of the Metropolitan Terminals of the Erie Barge Canal

CALLAN BROTHERS, INC., of New York City are the first and largest long distance motor truck haulage contractors who have closely connected their service with the longest artificial waterway in America, the Erie Barge Canal. This canal runs across the State of New York, from Buffalo, which is located on Lake Erie, connecting with the other Great Lakes, with the freight service of numerous large ships operating to Cleveland, Toledo, Detroit, Duluth, Superior, Milwaukee, Chicago and other important ports. The Erie Barge Canal is 387 miles long and was built by the State

of New York, at a total cost of \$52,510,800. It was recently taken over by the United States government, to be operated under its control for the period of the war, in order that they can divert from the overloaded railroads to this canal millions of tons of freight. This diversion of freight from the railroads to the canal has necessitated the use of large numbers of motor trucks for haulage to and from the terminals of the canal transportation lines, a need that is increasing as the volume of shipments is increased.

In taking over and operating the Erie

Barge Canal the government has regulated shipments according to their essential values. Canal rates are the same as rail at present. Telephone service will permit shippers to trace the progress of their goods at all points.

Callan Brothers have closely connected their eight large warehouses and motor truck service with the terminals of the canal in New York City and at other important transshipment points along the canal up the state and perfected an almost complete system. Their main storage yards, sheds and offices, 214 East 135th street, are located along the Har-



Six of Callan Brothers' Fleet of Motor Trucks Loaded with Malt Hauled from Steamship Piers to Callan Warehouses. Eight Tons on Each Truck.



Seven and One-Half Tons of Compressed Cotton Bags. Each Bale Weighs Over One-Half Ton.

iem River Ship Canal (otherwise known as the Mott Haven Canal), which is one of the terminals of canal shipments in New York City, extending from the North river to Long Island Sound. The Harlem River Ship Canal is eight miles long and cost \$2,700,000. Callan Brothers unload freight direct from the canal barges at their wharf alongside their yard, for transshipment by their large fleet of motor trucks, and delivered direct to the consignees or to Callan warehouses, to be held for future delivery in New England, New Jersey, Delaware, Pennsylvania or other seaboard states, or to the trans-Atlantic steamship piers in New York City.

The Extent of Motor Truck Freight Haulage.

Until the fuel shortage last November necessitated the use of every available railroad car for the haulage of coal few motor trucks were seen on the public highways operating beyond the customary distance of an average radius of 100 miles from New York City and other large centers. The congested condition of the railroads was beyond the managements to reduce, and in this great emergency the primary endeavor was to clear the principal lines in every direction so far as possible, which diverted freight to road transportation, so that thousands of trucks were used for long distance haulage. In consequence of this new demand for overland transportation a number of highly organized, well located motor truck hauling contractors developed efficient organizations and acquired adequate equipment to meet the unprecedented demand for freight carrying. The motor trucks used in connecting the broken lines of shipping by railroads are replacing the service of the local freight trains on "short hauls" to a considerable extent, thereby releasing freight cars for the more essential shipments on longer hauls, which is most urgently advocated by the government.

Embargoes on shipments of certain classes and quantities of goods and the congestion of the terminals in many of the large eastern cities undoubtedly will continue. The unavoidable condition of delayed delivery of goods by railroad is compelling many shippers to use motor truck service almost wholly, and in many instances eliminates handling the freight at the receiving terminal and institutes a direct store and factory delivery. Ship-

ping freight by motor trucks means less handling and insures a safe delivery and less damage. It eliminates at least five handlings of the goods when shipped by railroad: First—From factory or warehouse to freight station; second—loading from freight station or truck to cars; third—unloading at destination from cars to trucks

or freight station; fourth—unloading from trucks to stores, factories or warehouses; and five handlings in case the goods are removed from the car to the freight station and held until the consignee sends a motor truck to remove them.

Examples of Long Distances Covered by Motor Trucks.

The distances covered by motor trucks considered to be practical by some, average from 100 to 300 miles, and in special instances trips of 400 miles have been made. An exceptional demonstration of long distance hauling is the service of the Goodyear Tire and Rubber Co., which operates between Akron, O., and Boston, there being a fleet of trucks that carry rubber products to Boston and return from Killingly, Conn., with loads of tire fabric. These machines make the round trip of approximately 1560 miles in from six to nine days, depending upon the weather and road conditions, being driven between terminals with no stops other than for meals and supplies (save in the event of accident), and they are each manned with a crew of two men, one of whom drives while the other sleeps.

The necessity of speeding up all movements in commercial operations during the war period has given the owners of motor trucks the opportunity for a broader range of service, and the establishing of long distance motor truck hauling is, no doubt, the forerunner of a continuation of such service after the war will have been ended. Incidentally, the serv-

THE EQUIPMENT, PLANT, ORGANIZATION AND SERVICE OF CALLAN BROTHERS, INC.

Operate a fleet of 40 7½-ton Mack trucks.

Long distance hauling to any distance up to 400 miles.

Specialists in the transportation of heavy freight with equipment to meet any demand.

Service linked with the Erie barge canal, the great waterway that opens to shippers practically all of upper New York state.

Eight, large, modern warehouses with 900,000 square feet of storage space.

Operate two immense garages with a total capacity for 130 trucks.

Operate body making and paint shop.

Operate machine shop and repair stations.

All departments conducted on a closely interlocking, perfected system.

Personal attention, on part of owners, to all work and the economy in operation on a systematic basis, saving in damages and all lost action—a big factor in rates and service, which is wholly in favor of the shipper.

Day and night service.

ice now being rendered by motor trucks is clearly demonstrating to manufacturers and merchants the only way to escape delays in slow moving local railroad freight trains and the loss of time that had been frequently experienced even before the railroad freight congestion had become so acute.

Some Classes of Goods Hauled.

Department stores in New York City and Philadelphia are extensively patronizing the long distance motor truck



Eight-Ton Load of Cotton Unloaded at the Bush Terminal, Brooklyn.



Seven and One-Half Tons of Rolls of Print Paper.

freight service. By this means of transshipment merchants are assured of an uninterrupted receipt of goods. The products carried by long distance motor trucks have hardly any limitations, and recently several tons of finished leather, valued at \$40,000, were shipped by motor truck from Philadelphia to New York City over night. If the railroad service had been used at this particular time delivery would have required from four to seven days. Machinery manufacturers and cotton and woolen mills in New England cannot now well await the arrival of slow incoming freights. They have their raw materials delivered to them by motor trucks in express time. Heavy machinery is delivered direct from shops and foundries in Connecticut to factories in New York City. Wholesale grocers deliver in Washington from warehouses in Baltimore. Tons of chemicals (high explosives that railroads refuse to carry) are delivered by motor trucks with but one handling after they leave the chemical works. Examples too numerous to mention and in all lines of commercial activity are most ordinary.

Closely Connecting the Market with the Farmers.

On routes under 100 miles motor trucks are of untold benefit to farmers. Thousands are now served by motor truck express lines and without the service of trucks they would hardly be able to ship milk or farm produce. Aside from that the service has enabled them to largely increase their production, with a certainty of reaching the market.

The rural motor truck express service has reached an interesting development in many states and especially in Maryland, where 20 lines carrying supplies into Baltimore and Washington have a daily capacity of 115,690 ton-miles and can haul more than 500 tons a day into those markets and carry an equal amount of merchandise back to the farmers and country merchants.

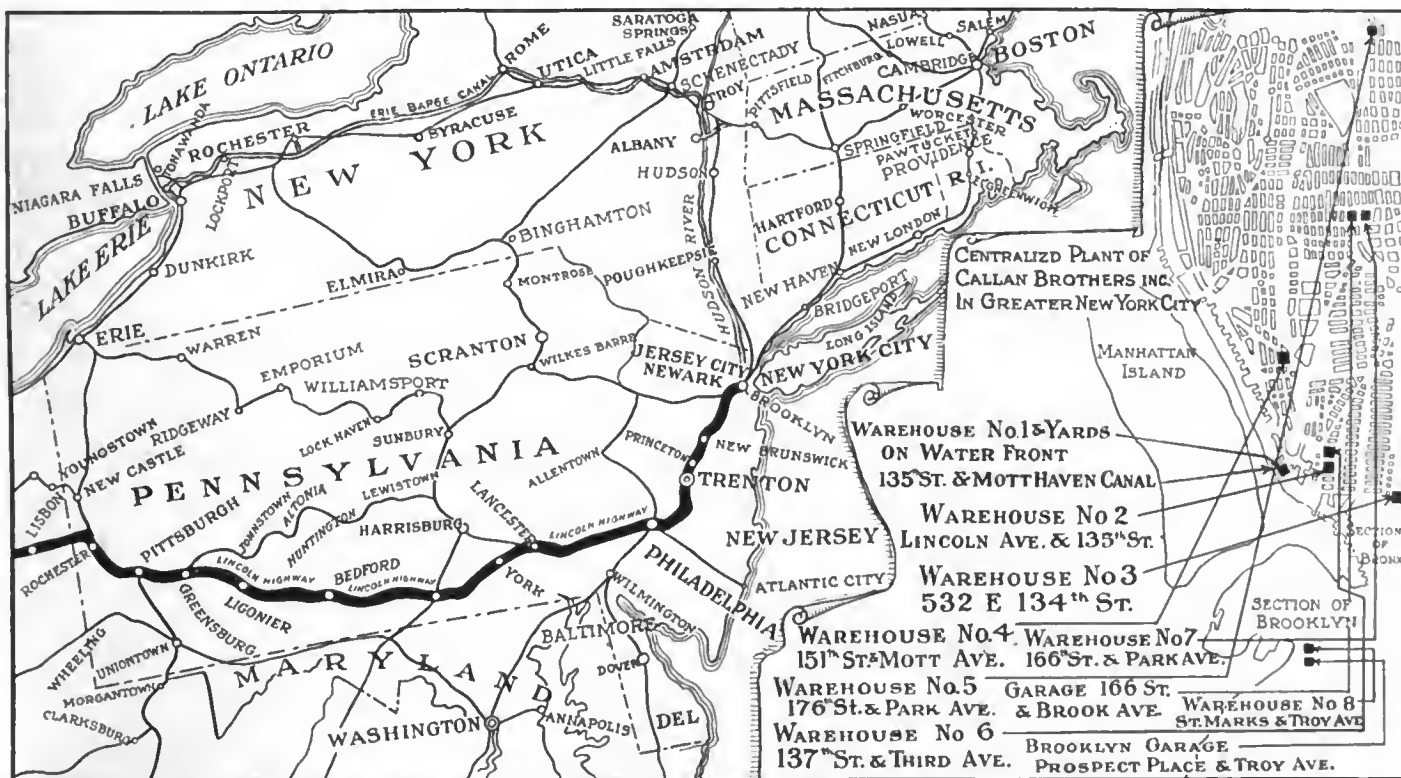
The United States Food Administration has requested all local food administrations to assist the rural motor express plan, pointing out that one man with a truck can haul as much farm produce as three men with wagons and

cover three times the distance and thus be a great saving in time and labor.

The Dominant Example of Motor Truck Service of Callan Brothers, Inc.

The object of making the foregoing statements is to emphasize in a general way the conditions that have or now obtain with reference to railroad transportation and why industrial and commercial interests have turned to the use of motor trucks to haul materials and products for what had been considered "short hauls." Callan Brothers, Inc., having organization and equipment and facilities for handling large tonnage, has been turned to by business men first to meet emergencies, and then because of the efficiency of the service, to insure against interruptions and delays in carrying on their operations.

Callan Brothers, Inc., have been engaged in the contracting haulage business for the past 15 years and have always been progressive and a potent factor in the haulage business in that city. Until 1911 they used horse drawn trucks and maintained a large stable of horses. Their experiences with horses became entirely discouraging as new requirements in haulage had to be met and hardly a day passed when they did not have a number of animals inactive on account of overwork or illness. In one year 22 of their horses died from glanders alone. It is extremely interesting to learn that the upkeep expenses on the horses were considerably greater than those on their motor trucks, when counterbalanced by the capacity and more extended distance of travel of which motor trucks are capable. Callan Brothers



Map of Territory Over Which Callan Brothers, Inc., Operate Their Local and Long Distance Motor Truck Service. This Map Shows the Sections of the Bronx and Brooklyn, with Locations of Their Offices, Yards, Harlem River (Mott Haven) Canal, Garages and Warehouses Designated, and Also Manhattan Island, Where Their Operations Are Extensive. The Route of the New York State Erie Barge Canal Is Also Shown. The Canal Proper Terminates at Troy, Where It Is Connected with a Branch Canal Running to Albany and Thence the Route Is by the Way of the Hudson River to New York City.



A Section of the Yards of Callan Brothers, Back of Their Offices at 214 East 135th Street, the Bronx, Showing the Harlem River Ship Canal (Mott Haven Canal) and the Freight Yards of One of the Trunk Line Railroads. A Large Shipment of Barrel Staves Is Shown, Which Was Unloaded from Erie Barge Canal Boats, to Await Transfer by Callan Trucks to a Steamer Sailing for South America.

were the pioneers in the Greater New York City district to purchase motor trucks for local and long distance heavy hauling.

Realizing that misfortunes and excuses for the shortcomings of their service with horses never moved any considerable tonnage on time nor increased their revenue and in line with their policy to give satisfactory service at any reasonable expense, they were gradually forced to adopt motor trucks and now operate them exclusively. At present they have in their local and long distance motor truck freight haulage service a fleet of 40 Mack trucks, each of $7\frac{1}{2}$ tons capacity, and are constantly adding to this fleet.

Callan Brothers' consistent business policy and efficiency in management has gained for their service attention outside of their own city and many inquiries and orders for their trucking service have been received from shippers all over the United States. They have standardized their motor truck equipment with a single type and size, in order to obviate the confusion that they had experienced in trying to maintain a spare parts department covering the requirements of several different makes of trucks they formerly had in their service. Their fleet of trucks has capacity for carrying 300 to 400 tons daily, varying according to the distances of the trips; and in many instances where the trips are short the aggregate carrying capacity of the fleet will average more than 400 tons daily, and their business has grown to such vast proportions that their entire fleet is in constant demand.

Thousands of Tons of Building Material and Other Goods Hauled.

Previous to the past year, when building operations in the Greater New York City district were considerably curtailed, Callan Brothers had completed a number of big contracts, hauling face brick

and cement by motor trucks. They delivered all the cement used in the construction of the stations of the new subways, and also delivered all the cement to the shafts of the Catskill aqueduct water system in the Bronx and Manhattan, amounting to thousands of tons. They also delivered thousands of ties to the sites of construction of the latest subways, besides completed many other big contracts of haulage in connection with building operations.

Dependability of Callan Service Under All Conditions.

The company experienced a successful test of endurance of their trucks, drivers and helpers during the severe

weather last winter. Railroads were stalled, with freight piling up and their tracks blocked with snow, and in some instances several of the railroads were entirely out of commission for days.

The large daily newspapers of the city were caught on the verge of a paper famine. Thousands of tons of paper were in transit and stalled on the blocked railroads a number of miles outside of the city. A rapidly diminishing stock was stored in the warehouses of the paper mills within the city limits. The shortage of print paper became so acute that some of the publishers feared that they would have to discontinue their issues for a time. Callan Brothers were enlisted to clear the way and deliver the paper. For several weeks they operated a day and night service with 10 of their Mack trucks, and there was not an instance of a single press being stopped for the lack of paper.

Freight congestion, which was more aggravating and beyond the quick control of the railroads, more particularly within a radius of 400 miles of New York City, reached its crux of stagnation last winter. Then many industries and commercial concerns were forced to adopt other means of getting their freight from inland centers to the city and to ship their goods to customers beyond the city. Here again the efficient motor truck service of Callan Brothers was drawn upon to fill in the broken chain of transportation caused by the overloaded railroads. As in many instances before they proved their equipment, plant and organization equal to the emergency and won for themselves a reputation that extends to hundreds of the largest shippers in all sections of the country.

Examples of Callan Long Distance Hauls.

Last winter, without interruption and through the severest storms, their trucks



Pier Six, One of the Erie Barge Canal Terminals in New York City, Which Is One of the Connecting Links in the Extensive and Complete Service of Callan Brothers.



New York State Erie Barge Canal. Two Hundred and Fifty Tons of Iron Pipe Was Unloaded at an Erie Barge Canal Terminal Near New York and Transshipped to Points in the New England States. This Shows the First Fleet of Boats Carrying This Pipe, Being Unloaded Onto Callan Brothers' Trucks.

were driven on daily schedules to the following places, carrying thousands of tons of brass, paper, food stuffs, cotton, compressed cotton bags, oils and other products, deliveries being made to manufacturers and merchants in New York City and return loads from New York City being delivered to consignees in the cities designated:

	Miles	Hours Per Trip
New York to Philadelphia.....	100	12
New York to Baltimore.....	188	22
New York to Dover, Del.....	172	21
New York to Waterbury, Conn.	95	11
New York to New Haven, Conn.	77	9
New York to Bridgeport, Conn.	58	8
New York to Hartford, Conn.	113	16
New York to Springfield, Mass.	139	18
New York to Worcester, Mass.	190	23

Aside from these trips the company's trucks carried a large quantity of lumber and other materials to a number of the army cantonments in New Jersey and Long Island. Another instance of the efficiency of their service was that of transshipping 250 tons of iron pipe from boats at an Erie Barge Canal terminal near New York. Six of their 7½-ton trucks were used on this job, each truck making a round trip of 125 miles every 16 hours. The contract was completed in one week.

Broad Range of Operations Requires a Flexible System.

Callan Brothers maintain a thorough system of costs of operation and on account of their close attention to all details they meet all conditions and attain splendid results. They anticipate their customers' interests and plan all works to serve them on schedule time and in the most economical way. They aim to schedule the arrivals of deliveries at destinations, so as to afford ample unload-

ing time before closing down for the night and not inconvenience the customer. Nevertheless, it must be reasonably considered that delays caused by "hold-ups" at terminals, congested traffic and possibly by accident are liable to occur, and in such cases delays are unavoidable. Their rule is to ask a day's notice when engaging their services on work out of the ordinary, in order that a sufficient number of trucks may be available. Rates for long distance hauling vary and are based on the class and size of load to be carried and the distance to be covered.

900,000 Square Feet of Warehouse Storage Space.

Callan Brothers are able to take care

of a great volume of inter-city long distance freight. Their service is connected with several terminals along the Erie Barge Canal, the principal terminals being located in New York City. In connection with this service they have eight large warehouses, with a total of 900,000 square feet of floor space, located at convenient points in the Bronx and Brooklyn, as shown on the map. Here goods of manufacturers located at interior points are stored for specified delivery. Seven of their warehouses are located in the Bronx, the rapidly growing section of Greater New York City, located north of the Harlem river. Six trunk lines of railroads have receiving stations close to the Bronx warehouses. These railroads are the New York Central and New Haven roads, which have their metropolitan yards at the Harlem river, and the Pennsylvania, New Jersey Central, Baltimore & Ohio and Lehigh Valley railroads, which have receiving stations, with terminals in Jersey City. Three of their largest warehouses are located near their main yards and offices at 214 E. 135th street. Here are also located their docks along the Harlem River Ship Canal (Mott Haven Canal), allowing all shipments over the Erie Barge Canal free docking privileges. As must be realized they act as receiving and forwarding agents for a great number of out-of-town manufacturers. It is almost impossible to conceive a more complete system and one so broad, which has been developed almost wholly by the use of motor trucks.

The Company's Garages and Repair Shops.

To maintain a fleet of 40 7½-ton motor trucks necessitates an efficient and far-reaching sustaining service. They have their own completely equipped machine and repair shops, where a corps of competent mechanics is employed, and to this department much of the credit of



Callan Brothers' Largest Garage at 1220-1241 Prospect Place, Brooklyn. Size 138 Feet by 155 Feet. Capacity, 50 Trucks.



Callan Brothers' New Garage at 166th Street and Brook Avenue, the Bronx. Size 85 Feet by 108 Feet. Capacity for 50 Trucks. Service Car at the Left.

dependable service is given. They build, paint and repair all truck bodies in their own shops. They operate garages at 1229-1241 Prospect Place, Brooklyn, size 138 feet by 155 feet, with a capacity of 80 trucks, and at 162nd street and Brook avenue, the Bronx, with a capacity of 50 trucks, which was just lately completed.

One of their trucks has been in service for four years and has never had its engine taken down for a general overhaul. This truck is still in commission, carrying its rated capacity load every day, an

example that makes clear the care given all their vehicles.

The Personal Attention and Touch Given Callan Brothers' Business.

Most every successful business has dominating personality back of it. It may not always appear in the foreground of actual operations, nevertheless, its power is felt and shown in the results attained. In the great volume of business handled by Callan Brothers, the personalities of Thomas and Matthew Callan, the build-

ers of the business and the directors of the firm, and of Arthur E. Dempsey, their supervising expert, are shown. They have created and are still building a remarkable business by personally giving strict attention to every detail and eliminating all lost motion, overhead expense, time and labor. Keeping operating costs to the minimum enables them to make more moderate rates to shippers, and this is appreciated if volume of business done is a criterion. A service car is shown in front of their Bronx garage, illustration on another page. In this machine they drive to points of operations and personally supervise the work being done. All drivers call the office by telephone and make a general report, including the time of their arrivals at destinations, and then receive further instructions.

There can be no weak link in the organization and service of Callan Brothers, Inc. Truly they offer an exceptionally efficient service in long and short distance haulage, are in a position to meet any reasonable demand for storage, are serving customers within a radius of 400 miles from New York City, and with a thorough knowledge of transportation needs they can look forward to an expansion of a business with hardly any limitations. Back of all this is the Callan efficiency and methods that keep and hold the business of an ever increasing number of patrons.

A company consisting of distributors of Bethlehem trucks in New York City and its suburbs, numbering 36, visited the plant of the Bethlehem Motor Truck Corporation, Allentown, Pa., July 10. According to statement made the 1917 production of the company was 5000 trucks, and thus far this year about 6000 machines have been turned out.

The Chicago office and salesroom of the Hyatt Roller Bearing Co. has been removed from 1125 South Michigan avenue to 2715 Michigan avenue.

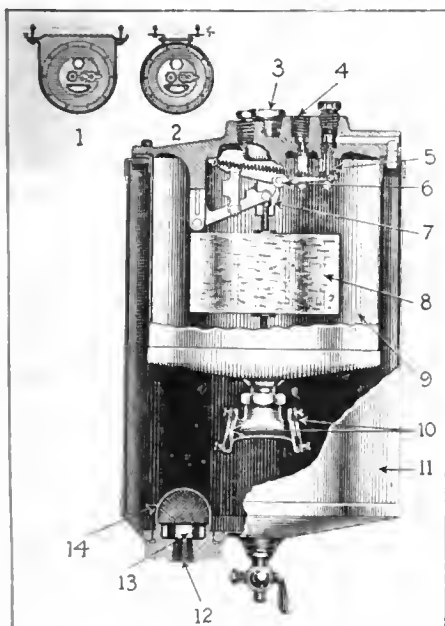


Callan Brothers' Warehouse No. 2, Lincoln Avenue and 135th Street, the Bronx.

HEAVY DUTY STEWART VACUUM FUEL FEED SYSTEM.

A type of vacuum fuel feed system that is especially designed for use with all heavy duty gasoline engines, for tractors, trucks and stationary power production is now produced commercially by the Stewart-Warner Speedometer Corporation, Chicago. It is known as model 146-A and it is built heavier than any system previously produced. It has largely increased capacity and accelerates the flow of gasoline. It is made in two sizes, one with a round shell having 3½ pints capacity, and one with a D-shape shell having five pints capacity.

One of the features is that it has a



Stewart Vacuum Heavy Fuel Feed for Trucks and Tractors: 1, D-Shape Reserve Tank, Capacity Five Pints; 2, Round Reserve Tank, Capacity 3½ Pints; 3, Gasoline Inlet; 4, Vacuum Line; 5, Venturi Type Air Relief Valve; 6, Nickel Plug; 7, Flapper Check Valve; 8, Cork Float; 9, Large Capacity Inner Chamber, Capacity 30 Gallons an Hour at Five Pounds Vacuum and 20 Gallons an Hour at Two Pounds Vacuum; 10, Double Flapper Valve; 11, D or Round Shape Reserve Tank; 12, Outlet to Carburetor; 13, Sediment Trap; 14, Gasoline Trap Strainer, Removable with Trap.

flapper check valve in the gasoline line at the top of the tank, which prevents the gasoline receding when the suction ceases. This keeps the gasoline line full, so that the instant the float chamber is emptied the filling is begun automatically. The air vent is a venturi type, which insures instant action and rapid emptying of the inner chamber into the lower chamber. The inner chamber has a double flapper valve, which allows it to be emptied in half the time that would be required with a single valve.

The float is of cork, heavily coated with Acco, so that it cannot become saturated with gasoline. There is a removable strainer in the gasoline outlet to the carburetor that filters the fuel and insures its purity. The tank is fitted with a petcock with which gasoline may be drawn for priming or other use, or water may be drained. The capacity of

the system is 20 gallons an hour at two pounds vacuum and 30 gallons an hour at five pounds vacuum. At either of these the system will supply a much greater volume of fuel than could possibly be consumed.

STATE BUILDING BRIDGES.

The highway department of Pennsylvania has under a law that recently became effective assumed the maintenance of all bridges originally built by townships and on state highways. According to Highway Commissioner O'Neil the very heavy road traffic and the increase of power truck transportation has made the work of the department with reference to care of bridges a task of large proportions. The purpose of the department is to replace old bridges with new wherever necessary, and where no bids have been received or bids have been rejected the department will rebuild bridges with its own organization. The policy of the state is to make all bridges safe for heavy loaded vehicles.

UNITED STATES TRUCK ORDERS.

Recent orders for United States trucks received by the United States Motor Truck Co., Covington, Ky., include 50 for the L. S. Bowers Co., Philadelphia, for distribution in eastern Pennsylvania, New Jersey, Delaware and part of Maryland; 10 trucks for the C. V. Rainey Auto Co., Jasper, Ala.; 40 trucks for the Empire Motor Car Co., Memphis, Tenn., and another shipment of considerable numbers for the Heletio Auto Service Co., St. Louis, Mo. These trucks are driven over the roads from the factory as the machines are completed.

LANE COMPANY'S EXPANSION.

The general offices of the Lane Motor Truck Co., Kalamazoo, Mich., are being removed from the building occupied by the company and located in an adjacent structure, and the vacated space is to be equipped and used for manufacturing. This change will increase the output of trucks somewhat. The company is well fortified for production, having considerable material on hand, and it has obviated transportation delays by hauling material from manufacturers in its own trucks.

The Fulton Motor Truck Co., Farmingdale, L. I., entertained a party of daily and technical press writers at its plant June 25, the purpose being to show to them the factory facilities for production. One of the events of the day was a visit to the aviation field at Mineola, where those who desired to make trial spins in the air were taken up by aviators.

H. A. Van Tine, well known in the power vehicle industry and trade in New York City and the East, is now factory manager for the Hurlburt Motor Truck Co., which has a plant at 133rd street and the Harlem river in New York.

MORRILL GOES TO BUDA CO.

L. H. Morrill is now associated with the Buda Co., Harvey, Ill., builder of Buda truck and tractor engines, as assistant engineer in the engineering department. He resigned from charge of the engineering department of the Northway Motors Co., Detroit, which position he held for two years, to associate himself with the Buda company. He has had long and varied experience as an engine designer, and his retention by the Buda company is claimed to be an evidence of the purpose to not only maintain the high standard of Buda engines, but to constantly endeavor to improve them.

SIBLEY WITH SANFORD.

The sale of Sanford trucks in New York state and Pennsylvania is now directed by Fred C. Sibley, whose appoint-



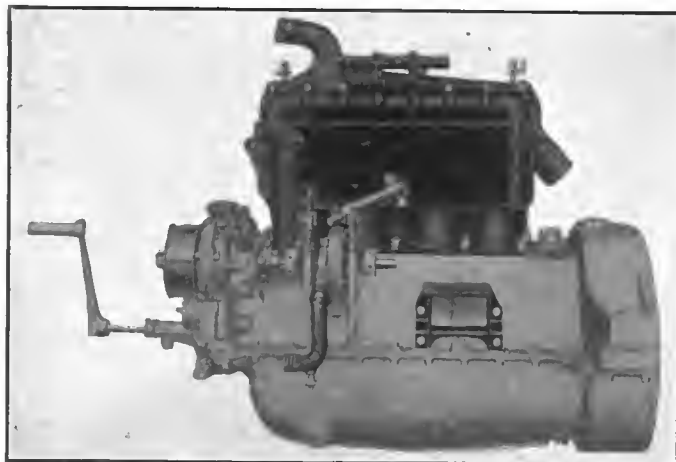
Fred C. Sibley, District Sales Manager, Sanford Motor Truck Co.

ment as district sales manager has just been announced by the Sanford Motor Truck Co., Syracuse, N. Y. Mr. Sibley is well known to the power vehicle trade, he having been for a number of years a special sales representative of the Chalmers Motor Co., Detroit, and the Willys-Overland Co., Toledo, O., in which capacity he was stationed in several territories and was brought in personal contact with numerous agents.

MICHIGAN TRUCK COMMITTEE.

A motor truck highway commission has been named by Gov. Sleeper of Michigan, which includes W. E. Metzger, C. C. Starkweather and H. S. Earle of Detroit, F. F. Rogers and C. P. Downey of Lansing, Chester Howell of Saginaw, George E. Yokum of Port Huron, Fred Z. Fantlind and John I. Gibson of Grand Rapids, Fred Hodges of Kalamazoo, J. D. Dort of Flint, W. B. Mitchell of Bay City and Bert Wickham of Lansing as secretary.

Buda HTU Truck and Tractor Engine



Left Side of the Buda Model HTU Heavy Duty Truck and Tractor Engine, Showing the Water Pump Drive.

A new type engine, that is known as model HTU, has been designed by the Buda Co., Harvey, Ill., and is now produced commercially in numbers. This engine is a development of Buda type to meet the requirements for tractor power plants, and it possesses the qualities that have been characteristic of Buda design and construction, as well as those known to be essential to the heavy duty work expected of machines built to produce farm power. The engine may be regarded as an improvement of the HU type, and it is designated as model HTU, but it differs from previous productions in that it has a detachable head instead of the head being cast integral with the cylinder block.

The engine is a four-cylinder, four-cycle, water cooled, L head type, with the cylinders $4\frac{1}{4}$ inches bore and $5\frac{1}{2}$ inches stroke. This has a rating by the S. A. E. formula of 28.90 horsepower, but this will be considerably exceeded in practice, according to the work for which it is used. If used for truck propulsion the power would be considerably higher than when used for tractor construction. Statement is made that the engine is the result of several years of study and experimentation to determine what type is best adapted for heavy duty, it being designed to consume low grades of gasoline, such as might be used for truck and tractor service.

The cylinders are cast en bloc with water jackets integral and with wide base flange and webs under the valve ell to seat a cover enclosing the valve stems and the tappets. The head is a single casting, liberally water jacketed, with the water outlet manifold channel rising gradually from the rear to the front to direct the movement of the water into the manifold, which is bolted on with studs. The combustion heads are in the head unit, with the spark plug bores located to practically center in the

chamber, this insuring a free circulation of water and good admixture of the fuel gases in the chamber. The head is retained to the block by a series of 21 heavy studs, as will be noted in an accompanying illustration. This manner of retention insures a perfect joint of the head and block. The exhaust and intake manifold is integral, so that the

fuel will be heated uniformly and gasification made certain.

The crank case is cast in two sections, with forward and rear extensions that house the timing gearset and the flywheel, and the upper section is divided vertically by a transverse web that carries the center main bearing. The lower section is the oil reservoir, that is removable to obtain access to the crank chamber to inspect or examine the main

and connecting rod bearings. There is a settling chamber in the oil pan in which the sediment in the lubricant may be collected, and this can be drained as desired. The lower section may be removed without taking the engine from the chassis frame or touching the main bearings, and the pistons and connecting rods can be taken out easily after it has been removed.

The engine is designed for three-point suspension and it is supported by a trunnion at the front end and heavy arms cast on the bell housing of the flywheel. These arms are bolted to the chassis frame. The inlet and exhaust valves have ports $1\frac{1}{4}$ inches diameter, these being operated by one camshaft. The pistons are cast iron the connecting rods heat treated steel drop forgings, and the wristpins case hardened tube carefully ground. The crankshaft is drop forged from open hearth steel, heat treated, machined, ground, carefully balanced and drilled with longitudinal channels for the force feed oiling system. The tensile strength of the shaft is 120,000 pounds to the square inch and the elastic limit 85,000 pounds to the square inch. The camshaft and cams are forged integral from open hearth steel. The cam and bearing surfaces are very large and are accurately ground. The cams are unusually large and designed for quiet function-

ing. Both the cam and crankshafts are three-bearing types.

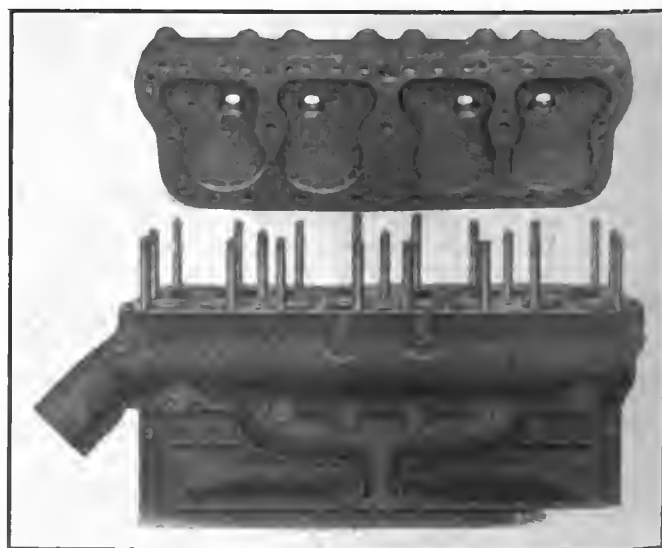
The gears of the timing gearset are large, with $1\frac{1}{2}$ -inch faces, helical cut and specially machined to obtain accuracy of centers and freedom from noise at all speeds. The three main bearings and the connecting rod bearings are high grade babbit in bronze shells, and the bearings of the camshaft are die cast babbit. The engine is cooled by a circulation of water forced by a centrifugal pump, driven by a shaft that is intended to drive a magneto, and on the forward extension is a wide pulley for a flat belt to drive the fan.

The engine is lubricated by a high pressure system, the oil being drawn from a screened well by a pump and forced through tube to the main bearings and then through the drilled crankshaft to the connecting rod bearings, and tube distribution is carried to the camshaft bearings, the wristpins and the timing gearset. The piston and cylinder walls and the cams and valve tappets are lubricated by spray from the centrifugal movement of the connecting rods.

DON'T WANT VEHICLE LAWS APPLIED LOCALLY.

Because of the shortage of help and that they have from time to time seen fit to have unlicensed men drive vehicles used for public service and for local delivery, the business men of the town of Clinton, Mass., have asked the police to enforce the laws relative to operating automobile vehicles less stringently, applying them only to out-of-town drivers who willfully disregard the regulations. This is a new angle of law enforcement for business men, and it is stated that the attitude is due to inability to keep men for any length of time and the necessity of using boys for drivers to meet emergency conditions.

With capital of \$50,000 Thomson's Auto Co. has been incorporated at Asbury Park, N. J., to manufacture automobile vehicles and machinery.



Cylinder Block of the Buda Model HTU Heavy Duty Truck and Tractor Engine with the Head Removed.

NATIONAL FARM TRACTOR DEMONSTRATION AT SALINA

Manufacturers' Exhibit Will Consist of 300 or More Machines and Implements Valued at More Than \$1,000,000—Only Practical Uses Permitted and Tests of Capacity Shall Be Made for the Benefit of Exhibitors, But Not as Competitions.

The demonstration at Salina will be the real opportunity for tractor dealers, or those proposing in business as agents, to educate themselves practically in sales knowledge.

No man can successfully sell farm tractors unless he knows something of agricultural necessities and the conditions usually met in farming operations. He can learn at Salina.

DEMONSTRATION of farm tractors at Salina, Kan., July 29-Aug. 2, inclusive, will be the only exhibition open to all manufacturers that will be organized to rules they themselves approve. It will be conducted by the Tractor Demonstration Committee appointed by the National Tractor and Thresher Manufacturers' Auxiliary to the National Implement and Vehicle Association, and will be managed by A. E. Hildebrand, who has been in charge of all national demonstrations organized by tractor manufacturers of the United States.

The event will be officially known as the National

12,000, but being a commercial center for a large agricultural area it is much more important in business transactions than the number of inhabitants would imply. Into Salina will be drawn many thousands of people—not with the purpose of finding pleasure and recreation, but intent upon learning all that can be taught by observation with reference to farm tractor work.

Educational Value of Demonstration.

There are those who may assume that in war time a farm tractor exhibition will serve no good purpose. The tractor manufacturers, after considering the prop-

The man who carefully prepares himself for selling farm power machinery will be able to convince farmers with facts they understand. Mechanical detail is but a part of the necessary information.

Knowledge of work with different implements is imperative with the tractor salesman. This will prove the utility of machines when worked with tractors—detail that is imperative.

Tractor Farming Demonstrations, and the plans have been made by a committee consisting of E. J. Gittins, H. B. Dinneen, Dent Parrett, H. H. Bates, Finley P. Mount, W. H. Haggard, J. B. Bartholomew, F. G. Allen and J. A. Everson, of which E. J. Gittins is chairman, H. B. Dinneen treasurer and Dent Parrett secretary.

Salina is almost due west of Kansas City and is nearly at the geographical center of the state, so that it is convenient of access for practically all the section of the United States west of the Mississippi river and from Canada to the Mexican line, and it is not prohibitively distant from the states east of the Mississippi. The city has a population of approximately

osition from every angle, determined that now, when the world is dependent upon the United States for its food, when the length of the war is uncertain, when there is prospect of even greater labor shortage, every endeavor should be made to educate farmers to the value of farm machinery to them, so that the country may not suffer from lack of food, the crops shall increase instead of shrink, and the war may be successfully prosecuted.

There is no question that farmers have two main objects in raising crops, the one being a patriotic duty and the other the substantial gain that shall result from large harvests, and seemingly they are equally potent factors. But without the utilization of ma-

Business is awaiting the farm tractor and implement dealer who goes after it. At Salina one of the best exhibitions of power machines ever organized will be seen by those who want knowledge.

The farmer will buy from the local dealer because he wants service, and service is becoming more and more important with the adoption of system and efficiency method in intensive farm operations.

achinery that shall compensate for the loss of man power through the calls to army and navy service and the production of other essentials, the land cannot be cultivated. The object of the demonstration is to prove the utility of power for all farm work. The engineering propositions of tractor design are inconsequential when contrasted with the immediate needs of the country.

Must Establish Confidence in Tractors.

More than anything else the people must be convinced of the possibilities with tractors and machinery that are obtainable. Development is costly from many points of view. Not only this, competitions cause uncertainty and doubt and controversy that would result in hesitancy as to use and consequent retardation of agricultural operations. More than anything else confidence in tractors, when used intelligently, is necessary, and from a patriotic viewpoint, if nothing more, the determination of the tractor manufacturers to have one national farm demonstration is entirely commendable.

Just how many tractors are operated in the United States is unknown. There has been a very large gain as compared with the number as of Jan. 1, 1917, and probably 100,000 is a very conservative estimate. Yet

this total is extremely small when the actual needs of the country is considered. In America the food crops have been usually much in excess of consumption. The yield per acre has always been much less than in Europe, where land is costly and labor relatively cheap, but measured by men the yields have been larger than in Europe. With machinery to replace manual labor greater acreage can be planted and corresponding crops grown.

The demonstration will be the sixth annual event since the manufacturers assumed control of these exhibitions. It will continue for five days, the private demonstrations being between 8 and 11:30 each morning the last four days, and the public demonstrations from 1 to 3 each afternoon unless otherwise arranged. The demonstrations will take place on a large open tract of land and the headquarters will be a series of large tents in which machines can be exhibited, lectures can be given and exhibitors can adopt whatever means may be desirable to educate the people.

Partial List of Exhibitors.

The number of exhibitors is not as yet certain, for these will be received up to the time of the opening of the demonstration. The tractor manufacturers who will participate in the exhibition are:

Some Manufacturers Who Will Exhibit Tractors, Implements and Accessories

Advance Rumely Thresher Co.	La Porte, Ind.
American Ford and Tractor Co.	Oklahoma City, Okla.
American Tractor Co.	Peoria, Ill.
Aultman & Taylor Machine Co.	Mansfield, O.
Avery Co.	Peoria, Ill.
Beeman Garden Tractor Co.	Minneapolis, Minn.
Bull Tractor Co.	Minneapolis, Minn.
Bullock Tractor Co.	Chicago, Ill.
J. I. Case Threshing Machine Co.	Racine, Wis.
Cleveland Tractor Co.	Cleveland, O.
Dart Truck and Tractor Corporation	Waterloo, Ia.
Dausch Manufacturing Co.	Sandusky, O.
Electric Wheel Co.	Quincy, Ill.
Emerson-Brantingham Implement Co.	Rockford, Ill.
Henry Ford & Son	Dearborn, Mich.
Four Drive Tractor Co.	Big Rapids, Mich.
Frick Tractor Co.	Waynesboro, Pa.
Gle Tractor and Engine Co.	Ludington, Mich.
Gray Tractor Co.	Minneapolis, Minn.
Guaranteed Tractor Co.	Chicago, Ill.
Hart-Parr Co.	Charles City, Ia.
Hession Tiller and Tractor Co.	Buffalo, N. Y.
Holt Manufacturing Co.	Peoria, Ill.
Huber Manufacturing Co.	Marion, O.
International Harvester Co.	Chicago, Ill.
Interstate Tractor Co.	Waterloo, Ia.
Joliet Oil Tractor Co.	Joliet, Ill.
La Crosse Tractor Co.	La Crosse, Wis.
Lauson Tractor Co.	New Holstein, Wis.
Lyons-Atlas Co.	Indianapolis, Ind.
Moline Plow Co.	Moline, Ill.
National Tractor Co.	Peoria, Ill.
Nilson Tractor Co.	Minneapolis, Minn.
Parrett Tractor Co.	Chicago, Ill.
Peoria Tractor Co.	Peoria, Ill.
Port Huron Engine and Thresher Co.	Port Huron, Mich.
R & P Tractor Co.	Alma, Mich.
Rock Island Plow Co.	Rock Island, Ill.
Royer Tractor Co.	Wichita, Kan.
Russell & Co.	Massillon, O.
Simplex Straw Spreader Co.	Kansas City, Mo.
Square Turn Tractor Co.	Chicago, Ill.
Three P Auto Tractor Co.	Davenport, Ia.
Turner Manufacturing Co.	Port Washington, Wis.

Velle Motors Corporation	Moline, Ill.
Vulcan Manufacturing Co.	Evansville, Ind.
Wallis Tractor Co.	Racine, Wis.
Waterloo Tractor Co.	Waterloo, Ia.

Implement Manufacturers.

J. I. Case Plow Works	Dixon, Ill.
John Deere Plow Co.	Moline, Ill.
Grand Detour Plow Co.	Dixon, Ill.
Kenison Manufacturing Co.	Solomon, Kan.
La Crosse Plow Co.	La Crosse, Wis.
Roderick Lean Manufacturing Co.	Mansfield, O.
P. & O. Plow Co.	Canton, O.
Oliver Chilled Plow Works	South Bend, Ind.
South Bend Chilled Plow Co.	South Bend, Ind.
Vulcan Plow Co.	Evansville, Ind.

Accessory Manufacturers.

Alamo Light Co.	Fallins, Kan.
American Manganese Steel Co.	Chicago, Ill.
Automotive Parts Co.	Indianapolis, Ind.
Bosch Magneto Co.	New York, N. Y.
Buda Co.	Harvey, Ill.
Byrne-Kingston Co.	Kokomo, Ind.
Champion Spark Plug Co.	Toledo, O.
Delco Light Co.	Davton, O.
Dismond Chain and Manufacturing Co.	Indianapolis, Ind.
Gurney Ball Bearing Co.	Jamestown, N. Y.
Hooven Radiator Co.	Chicago, Ill.
Hyatt Roller Bearing Co.	Chicago, Ill.
K-W Ignition Co.	Cleveland, O.
Lalley Light Co.	Detroit, Mich.
McQuay-Morris Co.	St. Louis, Mo.
Modine Radiator Co.	Chicago, Ill.
Mutual Oil Co.	Kansas City, Mo.
R. D. Nuttall Co.	Pittsburgh, Pa.
Oakes Co.	Indianapolis, Ind.
Remy Electric Co.	Chicago, Ill.
SKF Ball Bearing Co.	Hartford, Conn.
Sumter Electrical Co.	Chicago, Ill.
Timken Roller Bearing Co.	Canton, O.
Universal Light Co.	Salina, Kan.
U. S. Ball Bearing Co.	Chicago, Ill.
Vacuum Oil Co.	New York, N. Y.

Complete Rules Governing the National Farming Demonstrations

The following rules and regulations shall govern the demonstrations:

1. Public demonstrations shall begin at 1 o'clock and end at 3, unless other hours are announced by local committee at least 24 hours before starting time. Private demonstrations may be held in the forenoon from 8 o'clock to 11:30.
2. No exhibitor shall be allowed more than one tractor of

each size and type on the field during the public demonstrations doing the same kind of work. He may have one or more machines performing different operations, namely, one plowing, one disking, one seeding, etc.

3. Size of land for each tractor exhibitor for plowing demonstrations will be determined by the average number of plow bottoms pulled, the width of plows and speed of machine as

given in company's catalogue. Each tractor exhibitor must plow out dead furrow to its left.

4. All plows on any given gang must be set at the same depth and kept there during the day's demonstration. This depth will be announced daily by general manager. (Plows found operating otherwise will be ordered from the field for the balance of the day's work.)

5. All exhibitors will be allotted land in the same field or adjoining fields during each day's demonstration. Land for private demonstrations will be provided daily, in one field or adjoining fields.

6. In all public demonstrations the motor or tractor must not be run at more than 10 per cent. above its catalogue plowing speed. Tractors may be run on high gear with normal engine speed when disking, harrowing, seeding, etc.

7. Positions on field first day will be arranged by lot, in following manner:

Drawing to take place at 10 a. m. Monday, the opening day of demonstration, by serial numbers representing total number of exhibitors.

Position on field for the first public demonstration will be according to numbers, starting 1, 2, 3, 4, etc.

The total number of exhibitors will be divided into same number of divisions A, B, etc. "A" will occupy preferred position on first day public demonstration, and "B" preferred position on second day, etc.

Exhibitors who do not have representatives at drawing the drawing will be done for him under direction of the general manager.

Each exhibitor will be required to finish his land daily in a workmanlike manner, and assist in plowing the end lands as directed by the general manager.

8. Each field plowed will be surveyed and staked ready for afternoon demonstrations. These fields will be tested for the drawbar pull of a 14-inch plow, plowing at the specified depth previous to the demonstration. All manufacturers will be furnished information relative to drawbar pull so they can better determine the number of plows to use on each gang.

9. Each tractor shall bear a placard, to be furnished by the chief observer, showing the brake horsepower of the engine, the revolutions per minute, the plowing speed in miles per hour and the kind of fuel used and its baume test. Tractors using more than five per cent. of gasoline shall be classed as burning gasoline and be so placarded.

10. All tractors on the demonstration field belonging to one exhibitor must be kept on or along the land allotted him for that day's demonstration, until the hour designated by management for returning to headquarters.

11. No machine will be allowed to operate with special equipment other than that designed for practical use with same. No spectacular methods will be permitted on the part of salesmen or others to attract crowds. The demonstration must speak for itself.

12. Each tractor exhibitor will have the privilege of burning any kind of fuel he desires, but no one will be permitted to burn fuel of higher gravity test than that used by his competitor burning the same kind of fuel. All exhibitors will be required to obtain fuel from one source, such to be designated by general manager.

13. No time will be required of exhibitors to make movie pictures or group photographs for commercial purposes. Manufacturers can arrange to get photographs during the demonstration if they desire. Any manufacturer or representative of farm or trade papers, or news agency, will be allowed to have their official photographer on the grounds to get pictures for their own use.

14. Manufacturers will be privileged to make brake horsepower, drawbar pull and such other efficiency tests as they desire. All such tests desired should be reported to the general manager not later than July 15 so that sufficient number of prony brakes, dynamometers and other apparatus can be provided. These early announcements will also be necessary in order that suitable number of competent judges and sufficient acreage can be provided for all who desire to make tests.

15. The results of all tests made at the demonstration shall be furnished to the exhibitors only and such exhibitors may publish the results as official from the management of the demonstration. No official report of any tests made will be kept by the general manager, judges or the association except by permission of the exhibitor making the tests.

16. Manufacturers will be privileged to exhibit not more than two belt driven machines in connection with their exhibition.

17. Arrangements will be made for daily demonstrations showing use of tractors harrowing, disking, seeding and other farm operations, demonstrating general utility of the tractor. The rules governing these demonstrations will be the same as those applied to plowing.

18. The interpretation and enforcing of these rules shall be left to the local manager of each demonstration and the general manager of the demonstrations.

19. Each company exhibiting at these demonstrations shall appoint one manager who will be expected to report to the general manager not later than 8 o'clock each morning for instructions and information regarding the day's work. This manager of exhibits will be held accountable for the work of his company and no instructions will be issued to anyone else, nor will requests, instructions or complaints be recognized from anyone but this exhibit manager. He shall wear a badge furnished him, specifying his being official exhibit manager.

20. Each exhibitor will be expected to keep plows, tractors, etc., around his tent arranged in first class order, and the

land allotted him for exhibiting purposes free from circulars, rubbish, etc., such as will be distributed around headquarters daily. They will also be expected to use care at all times in operating machinery with respect to its safety for all visitors. The management will appreciate cooperation of these exhibit managers in all matters.

21. Each entrant will sign the rules and thereby agrees to live up to the rules and cooperate with the committee in every way to make the tractor demonstration a success.

22. The field manager shall have authority to order from the field any machine whose operator does not comply with the rules, and, further, any exhibitor who is manifestly disregarding the rules will not have land laid out or furnished for him on the succeeding days, or until such time as he has met the conditions.

23. No exhibitor joining the national demonstration will be permitted to exhibit until he has given correctly the price that he is in position to furnish tractors at regular production, the correct weight of tractors and all data pertaining to their construction and rating, minimum and maximum speed at which the motors are to run, and the committee have the right to have any such machines placed under test to prove the correctness of the data that is furnished.

JOIN ACME ORGANIZATION.

The Acme Motor Truck Co., Cadillac, Mich., is systematically increasing its sales organization by the addition of experienced supervisors of sales, and is making new agency contracts wherever the prospects are promising. In keeping with this policy it has appointed G. M. Rockwell, formerly connected with the Republic Motor Truck Co., Alma, Mich., district manager and special representative, to represent it in the first named capacity in Virginia, Maryland, Delaware and North Carolina, and in the last named capacity in the District of Columbia.

J. A. Bell, for a considerable period with the White Co., Cleveland, O., has been made district manager of the Gulf states east of Texas, and F. P. Walker, who was connected with the Hupp Motor Car Co., has been engaged to cover Nebraska and the western half of Iowa.

The Acme company has made dealer contracts with following concerns: I. F. Saunders, Roanoke, Va., as the Acme Motor Truck Sales Co.; Commercial Truck and Tractor Co., 2209 Farnam street, Omaha, Neb.; Stockdell-Myers Hardware Co., Petersburg, Va.; John E. Garcia, New Orleans, La., as the Acme Motor Sales Co.; J. P. Nicholson, 1532 Michigan avenue, Chicago, as the Acme Truck Sales Co.; J. W. Newcomers, Clarksburg, Va., and the Overland-Louisiana Co., Shreveport, La.

FLAKE GRAPHITE LUBRICANT.

Adequate lubrication is of paramount importance with the owners of power vehicles. Speaking broadly, 25 per cent. of the power generated is lost through friction, and the greater the degree of lubricity the less the fuel consumption and the higher the efficiency of machine for a given work. The means for lubricating the machine must be given careful attention and the lubricant must be selected with extreme care. Claim is made by the Joseph Dixon Crucible Co. that when flake motor graphite is mixed with oil or grease it is carried to all parts of the surfaces that are to be lubricated, and as the flakes will adhere to the faces of all moving parts contacting, a film is formed that fills all inequalities and prevents metallic contact. The graphite cannot be carried out and it remains a substantial preventive of wear, insuring the lowest degree of friction.

HAYES BUILDING STEEL WHEELS.

Preparations are making by the Hayes Wheel Co., Jackson, Mich., to manufacture steel wheels for trucks and tractors, which will be fabricated, and one floor of the company's plant will be utilized by this department pending the erection of a factory that will produce these exclusively. The company has specialized wire wheels for passenger cars for several years. The new wheels will be built under the Lachmann patents.

The manufacture will be directed by G. Stanley Porter, whose resignation as factory manager of the Jackson Rim Co., with which concern he has been connected for five years, will take place Aug. 1.

DIAMOND CHAIN AND MFG. CO'S PLANT



The Front Exterior of the New Plant of the Diamond Chain and Manufacturing Co., Indianapolis, Ind., 480 Feet Long and 60 Feet Wide, of Brick, Steel and Concrete.

IT HAS been a long step from the advent of the bicycle to the tremendous success of the motor truck and tractor, but the Diamond Chain and Manufacturing Co. of Indianapolis, Ind., has also grown and developed with the industry.

Back in 1890 this concern began the manufacture of roller chain for the transmission of power. Now its product is known in every village in the United States and in every foreign country. Like many other lasting successes the Diamond Chain and Manufacturing Co. has not had a mushroom growth. Its production has gradually grown, always just a step ahead, until it is now one of

the real successes in the motor truck and tractor accessory business.

The Diamond Chain and Manufacturing Co. does not feel that it "has arrived"—there is always room to grow and to improve. That it has grasped these opportunities and that it has made the most of them by always keeping its product at the ultimate in perfection is a well known fact among the trade.

Care Given to Manufacture.

Few know about the out-of-the-ordinary care and attention given to the manufacture of Diamond truck and tractor chain and it is impossible to do justice in this small space to so interesting a subject. The photographs from which

the accompanying illustrations are produced will give some idea of the proportions of the new factory into which the company has just moved.

Perhaps no product is manufactured under more ideal conditions. Certainly no higher manufacturing standard is in effect from the moment the raw steel is received until the finished chain has been given its final inspection. Every link, side bar, rivet and roller is minutely examined—then if up to the "Diamond" standard of quality it is passed. After this the links are assembled by special automatic machinery into chains of varying length. The finish chain is again carefully inspected—tested for



Rear of the Main Building of the Diamond Chain and Manufacturing Co., Showing the Railroad Siding Beside the Storehouse and Shipping Department.



View of the General Offices (In the Background) and the Order Department (In the Foreground).

strength. If the completed chain equals the strict requirements established it is then ready for service.

Plant on Six-Acre Site.

The location of the Diamond Chain and Manufacturing Co. is at the corner of Kentucky avenue and West street, standing on a site of six acres, five blocks from the center of the business district, commonly referred to as the shopping center.

Illustration No. 3 shows a view of the offices of the department heads of the



Part of the Assembly Room, on the Fourth Floor, Where the Chain Is Finished.

company, the foreground being a view of the order department. Orders are promptly entered here and delivered to the shipping department. The stock room shown in illustration No. 5 is located in the one-story building adjoining the main plant. Parts, such as rivets, rollers, side bars, etc., are case hardened in the hardening division shown in illustration No. 6. Here is where the wear is built into the finished chain, enabling it to give the long life and greater service for which "Diamond" chain is noted.

The blank parts after leaving the hardening room are then sent to the various departments, where the side plates are punched, the parts assembled. Then the links are ready for assembly into the finished chain, the rivets being spun by automatic machinery.

Plant Employees Number 1000.

To produce the millions of feet of "Diamond" truck and tractor chain demanded each year by the trade, about 1000 people are employed. To properly house this vast number of employees

under proper working conditions, to furnish them with a cooperative grocery store where they may purchase their provisions at cost, to provide the spacious lunch room and kitchen where hot meals are served each noon, to contain the welfare offices, with a hospital, library, rest room, etc., the mammoth factory shown in illustration Nos. 1 and 2 is needed. The main building is four stories high, 60 by 460 feet, and the one-story structure is 80 by 300 feet.

The building is supplied with many stairways, elevators, locker rooms, shower bath, etc.—every known convenience for the comfort and convenience of its army of faithful employees is provided by the company.

Aside from the pride in the product and the constant aim to keep it at the ultimate in perfection, the Diamond Chain and Manufacturing Co. is rightly proud of the splendid showing it has made in the Liberty Loan, Red Cross, Y. M. C. A. and other war fund campaigns.

This story will better acquaint you with the product and policies of the

Diamond Chain and Manufacturing Co.—will show you the methods which have enabled it, through conscientious devotion to a single product, a single policy and a single high quality to spring as from the little acorn to the mighty oak. It is their ambition that by means of the quality of their product and service they will continue to deserve their place in the sun—fit to participate in the enormous growth of the truck and tractor industry.

ACASON SALES ORGANIZATION.

Vice President and General Manager J. F. Bowman of the Acason Motor Truck Co., Detroit, Sales Manager Harry A. Conion and Advertising Manager D. J. Whitaker have been increasing the selling



The Raw Stock Room, from Which All Material Is Requisitioned.

organization of the concern, and systematic plans for distributing the largely increased production are being carefully followed out. The agencies in many of the large commercial centers of the East have been contracted for and the attention of the organizers is now directed to the middle and central states, where there is a large demand for highway transportation.

The state agency for Garford trucks has been obtained by H. C. Bailey, who has located headquarters at Reno, Nev.



Section of the Hardening Department, Where the Rivets, Rollers and Side Bars of Chain Are Heat Treated.

ECONOMY OF ELECTRIC TRUCKS

**Service Radius Adequate for All City Service,
Operating and Maintenance Cost Low, with
Extreme Endurance and Flexibility**

By EDWARD P. McDOWELL.

HOW to reduce the cost of the delivery department is the problem of transportation that is engrossing the attention of large business concerns throughout the country. The solution of this problem will be made when electric trucks are generally used for city deliveries and gasoline trucks for suburban or inter-city deliveries. It would be absurd to use a pile driver to drive a tack or a tack hammer to drive a pile, yet this is the simile that measures up the adaptability of the transportation equipment and methods employed by some of the transportation departments as conducted today.

Electric trucks are limited to a daily mileage as against the unlimited daily mileage of gasoline trucks; nevertheless, the electric truck for city deliveries of up to 50 miles costs at least 25 per cent. less to operate than a gasoline truck over the same mileage. According to my experience, 50 miles is the limit of daily work that can be reasonably expected of an electric truck.

Last winter's weather was the severest with which transportation departments had to contend in years, or, at least, the severest weather conditions since motor trucks were placed in service. During this stormy and exceptionally cold period

the five-ton electric truck in our service, by its consistent and dependable utility, proved conclusively that it could make city deliveries just as efficiently as our five-ton gasoline trucks. Appended is the complete summary of the operation of this five-ton electric truck for two weeks, with weather conditions so severe that many other trucks were stalled:

**Operating Cost of Five-Ton Electric Truck
on Basis of 25 Miles Per Day—300 Days
Per Year—Or 7500 Miles Per Year.**

Present price of five-ton chassis,
battery and body.....\$6,407.00

FIXED CHARGES.

Depreciation, 10 per cent (less
tires, battery and body)..... 272 70

MAINTENANCE CHARGES.

Battery upkeep (basis five years
life) 447.70
Tire upkeep (basis 8000 mile guar-
antee) 670.00
Mechanical parts upkeep..... 200.00

OPERATING CHARGE.

Garage, including supervision and
office 300.00
Miscellaneous expense, including
license 100.00
Current, 4c per K. W. H..... 420.00
Driver, \$25 per week..... 1,300.00

Total cost per year.....\$4,211.61
Total cost per day.....\$14.05
Total cost per mile......562

The foregoing figures are based on the present advanced prices and the use of only one five-ton truck. The most conservative transportation experts know that with large fleets of electric trucks in operation the operating costs are reduced with the exception of the chauffeur's wages, from \$1 to \$2 per day per car.

Depreciation has been figured at 10 per cent., less tires and battery and body.

Many fleets of electric trucks have been running in New York City for 12 and even 16 years. I know of one in particular, owned by one of the large department stores, which has been in its service 16 years.

Interest is figured at the rate of six per cent. on half of the investment. It hardly seems fair to charge more, as we established a fund under our depreciation heading for the purchase of new equipment.

The insurance charge is standard, but it is approximately 30 per cent. less for the electric truck. The chauffeur's salary at \$25 per



Five-Ton Electric Truck, Equipped with Rack Body, the Type of Machine of Which Operating Cost Figures Are Specified.

Interest, 6 per cent on one-half
price account..... 192 21
Insurance—Fire, public liability,
property damage, etc..... 309.00

Date	Miles per day	Total Amp. Hr. consumption	Amp. Hr. per mile	Total time in service	Total time standing	Total time running	Number of trips	Total tonnage carried	Ton miles operated	Road and weather conditions	Remarks
Feb. 18...	50.2	540	10.8	13:25	5:20	8:05	2 trips	9 tons	225	Good, cold	Zero weather
Feb. 19...	21.4	229	10.9	12:40	7:44	4:56	3 trips	14½ tons	80	Good, cold	Zero weather
Feb. 20...	34.6	314	9.8	11:40	5:47	5:53	3 trips	13½ tons	145	Good, very cold	First trip
Feb. 21...	30.5	313	10.4	12:20	8:16	4:04	3 trips	15 tons	125	Good, very cold	37 stops (4 to 5 inches snow)
Feb. 23...	27.1	349	12.8	11:24	7:22	4:02	2 trips	9½ tons	110	Fair, snow	(85 mile gale)
Feb. 25...	45.6	456	10.6	12:30	5:28	7:02	3 trips	14 tons	200	Fair, rain	
Feb. 26...	36.6	384	10.6	12:05	6:34	5:31	4 trips	19½ tons	155	Good, clear	
Feb. 27...	26.7	292	11.6	11:25	5:54	5:31	4 trips	20 tons	105	Good, windy	Five-ton load on return trip
Feb. 28...	48	433	9.2	11:35	5:35	6:00	2 trips	9 tons	215	Good, clear	
March 1...	38.8	397	10.4	11:00	6:04	4:56	2 trips	15 tons	165	Good, clear	
March 2...	31.7	288	9.9	9:00	4:21	4:39	2 trips	10½ tons	130	Good, clear	
Total...	291.2	3,995		128:44	68:05	60:39	30 trips	149 tons	1655		
Aver. per day	35.6	363.2	10.62				2 8/11	13 6/11	150		

week is less than some chauffeurs now receive on five-ton gasoline trucks. It is easier work for a chauffeur to drive an electric truck and causes less wear and tear on his nerves, besides he can keep himself cleaner, which naturally increases his self respect and general efficiency.

The battery charge is based on the cost of any good standard battery at the present advanced prices. In the selection of batteries it is advisable to be guided by the manufacturer of the electric truck you select. Vast improvements have been made in all the leading batteries recently and more improvements will follow. In my opinion the best is the cheapest. If the territory is flat some batteries give excellent results; if it is hilly some other battery may be better suited for the car. The selection of the proper battery, as well as its upkeep, is of great importance.

The cost of tires has been figured on the minimum guarantee of 8000 miles in 18 months, offered by the manufacturer. Nearly all tire manufacturers give 1000 miles more guarantee with tires used on electric trucks than they give on gasoline truck tires. This they can well afford to grant, as the absence of that sudden stopping and starting of an electric truck certainly saves the tires. It is not unusual to average between 12,000 and 15,000 miles to a set of tires.

The cost of current has been figured on the basis of the rate charged by the companies furnishing current in New York City for charging electric trucks. The maximum rates are five cents per kilowatt hour and these scale downward to two cents, depending upon the amount of current consumed. With 15 five-ton trucks in service the average cost per kilowatt hour would probably approximate slightly more than three cents. Many manufacturing concerns generate their own current and in that event its use is very advantageous, as the current can be taken from the off-peak load, as the trucks are usually charged late at night.

Mechanical renewals have been figured on the basis of our experience with this particular size of unit, as well as based on information from outside sources where I have been permitted to inspect the comprehensive and authentic records of operation of large fleets of electric trucks.

Importance of Cost System.

In connection with the operation of either large or small fleets of gasoline and electric trucks, the importance of keeping accurate records of daily maintenance costs cannot be too strongly emphasized; otherwise, the cost of operation will be problematical. It is also advisable to select as few sizes of both gasoline and electric trucks as the particular requirements of each business concern demands. This policy will work out a more efficient and economical service. There is no chance of electric trucks being commandeered by any of the governments in the war, as they are only adapted for short hauls.

Low Operating Cost of Electrics.

One of the foremost advantages of the

electric trucks is its low operating cost. The average gasoline truck consists of more than 3000 parts and the latest electric trucks approximately 1000 parts. It is reasonable to make the comparison that where there are so many parts needing constant attention more mechanics will be required to keep those parts in good running order. While the electric trucks require mechanical attention, they do not require as much attention as is usually given gasoline trucks.

The gasoline truck has constantly increased its operating area and in suburban and intercity deliveries will not be replaced by the electric; but electric trucks have also been proven to have ample mileage for use in any city delivery in practically any service.

Economical Haulage Urgently Needed.

Few people realize how important a relation transportation has with their own existence. With our railroads taxed to their limit we must necessarily work out our own transportation problems. Our government and her Allies are using vast numbers of gasoline trucks and their demands must be supplied first; consequently, this unexpected demand, caused by the war, has naturally made a shortage of gasoline trucks, while electric trucks can be more readily supplied to meet the shortage. The proper selection of the vehicle best suited for each concern's particular requirements is of paramount importance, as, for instance, if its deliveries are within a radius of 25 miles the electric truck should be given a fair demonstration and serious consideration.

Increasing Cost of Gasoline.

We must face the constantly increasing cost of gasoline and its decreasing quality. Ten years ago we obtained 70 specific gravity gasoline; now we rarely can secure 60 specific gravity gasoline, and, consequently, our mileage per gallon of fuel is reduced. Thousands of gallons used by a concern maintaining a large fleet of gasoline trucks is an item of no small cost.

There are now over 400,000 motor trucks in daily use in this country, exclusive of the government's trucks; and since there has been a considerable reduction in the production of new passenger cars this year, the large number of farm tractors, aeroplanes and motor boat submarine chasers in service will more than offset any saving of gasoline caused by the curtailment of manufacturing passenger cars.

It appears to be only a question of time when our navy and merchant ships will be burning petroleum instead of coal, which will certainly not decrease the cost of gasoline. There is a great scarcity of gasoline in all the European belligerent countries, and very stringent laws forbidding its use for passenger cars for private service were passed and are being enforced. No other condition in the world's history ever drew so heavily upon the supply of gasoline as the requirements of the vast fleets of gasoline trucks and aeroplanes in war service.

Flexible Control of Electrics.

During very cold weather in the city,

gasoline trucks, making frequent stops consume so much gasoline that often the chauffeurs have been obliged to buy additional fuel to complete their deliveries. When the trucks were stopped for unloading the motors were kept running, as it was difficult to start them if they became cold.

In using an electric truck the driver does not experience such trouble. When he stops his truck he shuts off the current and when he is ready to start again he merely turns the switch and has actually the equivalent of an engine starter. The ease of stopping and starting and the quick pick-up of speed in traffic are considerable advantages for the chauffeur.

Police records show that most of the accidents with gasoline trucks, in which pedestrians are injured or other vehicles are damaged by collision, usually occur at the close of the working day, when light is failing. These may in part be due to the drivers of the gasoline trucks becoming fatigued, after driving all day, and constantly shifting gears, through our narrow, traffic-congested streets. Electric trucks are so much easier to handle in traffic that the chauffeurs prefer to drive them. It requires only a few hours to train a man to drive the electric truck, but it takes days and weeks to instruct a chauffeur before he could be trusted to handle a gasoline truck.

There are approximately 500 users of electric trucks in New York City, of which 37, operating fleets of from three to 345, have a total of 1528 in service.

There is no intention of the writer to reflect upon the service or qualities of gasoline trucks, which I am even more enthusiastic about, for my sole aim is to encourage scientific methods of transportation, which after all are the most efficient and economical. In closing permit me to urge every one connected with the transportation and truck manufacturing interests to neglect no opportunity to prevail on our government officials to give us better paved roads.

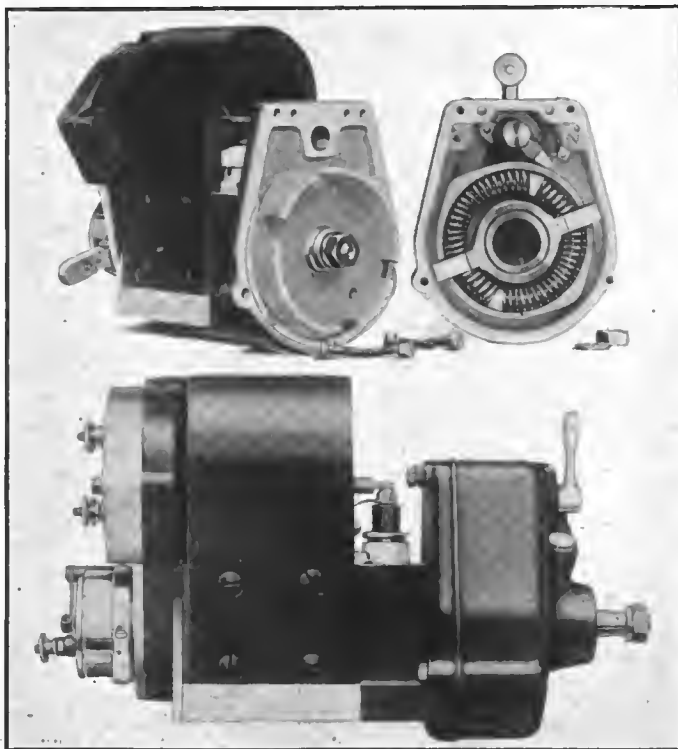
Well paved roads in France were an asset and one of the reasons why the French were able to turn defeat into victory at the first battle of the Marne. It is well known that the French railroads could not carry sufficient reserves, so all kinds of motor trucks, taxicabs and buses were used to transport the French army, and if the roads had not been in good condition the situation would have been very serious for France. We can no longer stand for badly paved roads, so use your influence where it will do the most good.

The Derf Manufacturing Co., Inc., has been incorporated in New York City to engage in manufacturing spark plugs, engines, etc., by W. H. Noble, F. L. Hartt and W. F. Wilson, with capital of \$100,000.

The Herrman Motor Truck of New Jersey, Inc., has been incorporated at Newark, N. J., with capital of \$25,000 to engage in the manufacture of automobile vehicles.

New Bosch Magneto Impulse Starter.

The Bosch Magneto Co. is now producing an impulse starter that is designed primarily for use with types DU4 and ZR4 independent Bosch magnetos for four-cylinder engines used for truck and tractor work, but it can be supplied for special orders for use with any standard types of Bosch magnetos for marine, automobile, airplane or stationary engines, or for any other ignition. It is not intended for attachment to any magneto now in use, and is supplied only as a part of new Bosch magnetos.



Bosch DU4 Type Magneto, with Impulse Starter, Showing the Instrument Designed for Easy Truck and Tractor Starting.

The impulse starter is designed to facilitate starting the engine, automatically increasing the speed of the magneto armature with slight turning of the engine shaft at the exact time to fire the cylinders, thus affording full electrical capacity of the magneto at very slow engine speed. In effect it is an auxiliary to the magneto that is interposed between the armature drive and the armature shaft. When the engine is turned the armature is held stationary, and the energy necessary to turn the armature is obtained by compressing a series of helical springs. At the predetermined position the springs are released and the armature is turned at high speed for a part of a revolution. The initial spark having been obtained the engine begins to fire regularly, and when it attains a speed of 120 revolutions a minute the starter is automatically disengaged and the armature drive takes up the work as a flexible coupling.

The construction of the starter is shown in the accompanying illustration.

It is contained in a water and dust tight aluminum housing and it consists essentially of two helical springs carried within a flanged disc. Meshing with the coils of the springs, which are on guides, are the arms of a cross member mounted on a sleeve by which the armature is driven, these arms and the seats against which the ends of the helical springs bear, being seated in the niches in the flange of a disc mounted on the armature shaft. As the driving sleeve is turned the springs are compressed, and when the point of desired compression is reached the compressed springs turn the armature shaft until the limit of expansion is reached. The movement is sufficient to fire an engine and then the starter is nothing more than a flexible coupling. As will be noted the entire movement of the armature before firing is less than a third of a revolution.

The operating parts are all high grade steel and have large factors of safety. The spring action is carefully balanced to impart even torque to the armature, and as the heavier part of the starter is carried on its own sleeve bearing there is no added strain on the magneto bearings. The starter is controlled by a lever mounted on a shaft extending from the front of the housing. The lever is constructed so that it may be operated by hand or connected with controlling linkage. Should the starter be accidentally engaged while the engine is running it will not be really functioning, and no damage could result. By the use of one oil cup the starter is fully lubricated, oiling being required monthly.

KETCHAM IS SALES MANAGER.

H. S. Ketcham, formerly sales manager of the manufacturers' division of the Bradfield Co., Detroit, has resigned to become the New England sales manager for the Cleveland Tractor Co., Cleveland, O. He will establish headquarters in Boston.

P. Damm, R. H. Fleischmann and L. M. Rothschild have incorporated the Manhattan Vehicle Corporation in New York City with \$60,000 capital to build wagons and automobile vehicles.

The Ver-Lux Manufacturing Co. has been incorporated at Dover, Del., with \$50,000 capital to manufacture spark plugs and automobile accessories.

Parcel Post Truck Service Begun.

Beginning July 1 the Postoffice Department inaugurated the system of parcel post transportation on what are known as "star" routes in different sections of the country, starting at Portland, Me., and extending south along the Atlantic coast and across country to New Orleans, La., with extensions west from several cities that will reach across the middle states to Indianapolis, and north and south, as well as several routes on the Pacific coast. The purpose of the route service is to handle parcel post parcels only, and to serve sections that could not otherwise be served as well or as expeditiously.

According to Fourth Assistant Postmaster General Blakesly a package sent from Portland, for instance, could be forwarded from one section of the route to another and in the course of two weeks returned to the point whence it was dispatched. The service was established after careful development of plans, but the machines were not all in readiness on the day for beginning and there were some instances where contractors could not at once take up the work as planned. The plan is being developed and perfected and the service is now working out satisfactorily to schedule. The volume of parcel post mail handled will no doubt increase very rapidly, as the public becomes informed of it, and the department plans to extend the routes as rapidly as this can be done and the organization and equipment added to.

HOWELLS JOINS SANFORD.

The sales force of the Sanford Motor Truck Co., Syracuse, N. Y., has been augmented by E. F. Howells as district sales manager, who has supervision of the sales in New York and Pennsylvania. Mr. Howells, who is well known in the trade, was formerly manager of the Philadelphia branch of the Chase Motor Truck Co., and later was sales representative in New York and Pennsylvania for the Chandler Motor Car Co. and was connected with the Buffalo branch of the Olds Motor Works in a similar capacity.

SANFORD PRICES ADVANCED.

The Sanford Motor Truck Co., Syracuse, N. Y., has announced the prices for its 3½ and five-ton chassis, including cab tops, will be \$3000 for the W 25 model, 2½-ton capacity; \$3975 for the W 35 model, 3½-ton capacity, and \$4750 for the model W 50, five-ton capacity. The new prices will become effective Aug. 1.

Walden-Worcester, Inc., Worcester, Mass., manufacturer of Walden-Worcester wrenches for automobile vehicles of all types, has established a branch office in the Monadnock building at Chicago, Ill., which will be the headquarters for its Middle West sales department.

Wisconsin Axles In Four Sizes

Four sizes of "Wisconsin" axles are now produced commercially by the E. B. Hayes Machinery Corporation, Oshkosh, Wis., these being rated as follows: 800A, 2000 pounds; 800B, 3000 pounds; 900, 5000 pounds, and 1000, 10,000 pounds. These axles are built to a design that has been very carefully developed and simplified, and which has been standardized for all sizes produced. The difference in any of these models is in dimensions only.

The Wisconsin axles are a semi-floating worm shaft and worm wheel type that are constructed from high grade materials and are especially suited to heavy duty service. The design of the 2½-ton axle, model 900, which is taken as the subject for this description, is typical of the others. The axle housing is a sin-

gle piece casting that has a bowled center with a large cover plate that, according to conventional practise, carries the differential gearset and the tunnel for the worm shaft and worm wheel.

The bores of the gears of the gearset are splined to receive the ends of the driving shafts. Under the edges of the bowl within the central section are webs that strongly reinforce the casting. The outer ends of the axle housing are enlarged and within them are machined seats for the end bearings of the axle shafts, which are also Strom single annular type of large size that carry the radial load and take the end thrust. These bearings are secured by plates that are bolted to the main casting. The driving axles are chrome nickel steel, heat treated to give 138,000 tensile strength, that taper from collars that seat against the bearings to the inner and outer ends, the greatest diameters being at the bearings. The axles are large size and to these the wheels are keyed and secured by locked nuts. The normal gear reduction of the axle is 8.66:1.

The brake spiders are bolted to the ends of the axle housings, brackets integral with the housing carrying the brake shafts. The brake drums are a concentric type, both sets of brakes being internal expanding, the inner shoes operating against a flange 15½ inches diameter and



Model 900 Wisconsin Axle, Capacity 5000 Pounds, a Semi-Floating Worm Shaft and Worm Wheel Truck Unit.

The housing is cast with box-type ribs, extending longitudinally from the bottom and sides of the center bowl to the ends, and the spring seats integral. These ribs very strongly reinforce the structure. The castings are annealed to give 75,000 pounds tensile strength to the square inch, and before the machining is begun they are inspected for strength by being mounted bottom up under a hydraulic press, and supported at the spring seats are subjected to loads of 40,000 pounds at the centers. Such stress is, obviously, much greater than the castings will ever endure in even abnormal service.

The cover plate of the bowl, which carries the differential gearset, is a heavy steel casting, the worm shaft tunnel being reinforced with ribs. Through bolts carry the differential gearset carriers. The plate is retained on the bowl by a series of cap screws. The differential gearset is a Brown-Lipe construction of standard type, selected from high grade material and machined with extreme care. The worm shaft and worm wheel are a David Brown type, the shaft being of special alloy steel and the wheel of phosphor bronze, carefully cut and finished by a specialist.

The worm shaft is mounted in two Strom heavy duty single annular ball bearings, which are retained by caps screwed into the ends of the tunnel. The differential gearset is carried on two similar bearings that are adjustable in the

2½ inches wide, and the outer shoes operating against a flange 20 inches diameter and 2½ inches wide. Claim is made that the brakes are much in excess of what would normally be required in service, and ample for any condition in which a truck would be practically operative. The axle is lubricated by a bath of oil carried in the bowl and distributed by splash to all internal parts. There is an oil filler nipple at the rear of the housing and a drainage plug in the base of the bowl. The only attention required is lubrication and flushing the housing at infrequent intervals.

The company states that the materials are the best that can be obtained and the work is done in a factory that is equipped with the highest grade machine tools, by workers who can produce extremely accurate work.

Trucks Supplant Mail Tubes

The use of pneumatic tubes for dispatching mail between the main post-office and sub-stations and terminals in New York, Boston, Chicago, Philadelphia and St. Louis has been discontinued, and the mail is now hauled with trucks, this being the result of President Wilson's veto of the annual postoffice appropriation bill and the subsequent passage of another bill without the clause providing an appropriation for pneumatic tube service.

The pneumatic tube service was first installed in Boston for private uses and later contract was made with the government to expedite handling mail and the service extended to other cities. The tube dispatching had limitations in size of packages that could be handled and there were occasional interruptions that necessitated vehicular transportation. Several recommendations were made for discontinuance by congressional committees, but no action was taken until the veto of the bill by the President. Trucks will now be used for handling the mail and claim is made that this will be more certain and expeditious.

OVERLAND MULE FOR INTER-FAC-TORY HAULAGE.

The plant of the Willys-Overland Co., at Toledo, O., has 115 acres of floor space, and that the production shall not be retarded supplies of all kinds must be distributed to the various departments from the store houses, and products moved from one shop to another, which requires trucking operations on a large scale. Different forms of transport were employed with varying degrees of efficiency until a factory genius conceived the idea of a small tractor for hauling trains of trailers that has been termed the "Overland Mule."

The machine consists essentially of an Overland passenger car engine mounted in a short, heavy frame, with a truck type transmission gearset and heavy axles and wheels. It has the flexibility of the car chassis, abundant traction power, and hauls the trailers in and about the factory with surprising economy.



The "Overland Mule" a Gasoline Tractor Adapted for Hauling Trains of Trailers at the Willys-Overland Co.'s Plant, Toledo, O.

MODEL F 2½-TON TOWER TRUCK

OBTAINING endurance of construction units and parts has been one of the primary objects of the designer of the series of trucks now in production at the plant of the Tower Motor Truck Co., Greenville, Mich., and this

as standard by truck owners generally, that are guaranteed by the reputations of the manufacturers, that have been developed by careful engineering organizations to afford practical efficiency and economies with reference to power production and transmission and to operating and maintenance expense.

The company has been established for a considerable period and the design of the trucks has been perfected. All experimental work has been completed and the manufacturing departments have been equipped and now have facilities for reasonable production. The factory organization is now sufficient to meet whatever demands shall be made upon it by the sales department, and in the course of two

the factory has been re-equipped and made ready for manufacturing to the number stated.

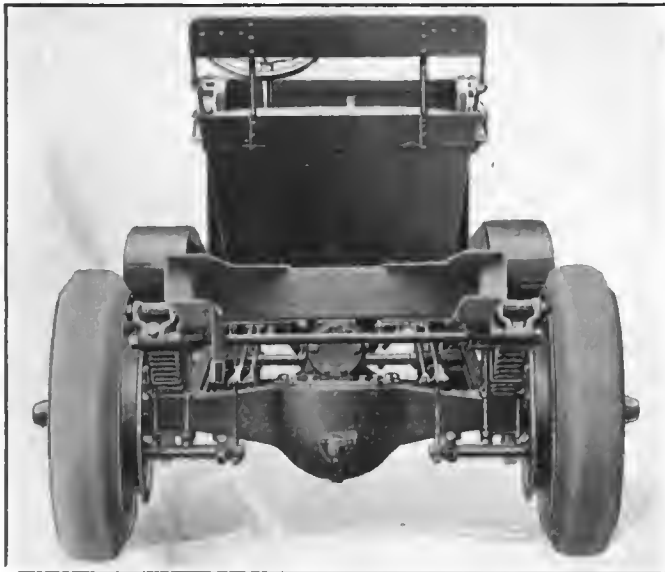
Liberal Service Policy.

The policy of the company with reference to service is such as to convince all buyers of its willingness to cooperate with them to insure maximum utility of the machines. The quality of the chassis is claimed to be the best that is obtainable, and that the owners shall have supervision and advice that will protect them fully each truck purchaser is given a book containing 50 coupons, each of which entitles the holder to two hours' work without charge once a week at the service station of any Tower agent. The only condition is that the coupons must be all presented within the first year after purchase of the truck. This means that the Tower company guarantees to each owner weekly service for one year, at the stations of its dealers, who are prepared to do the work required by the coupon, they in turn receiving payment from the company. The object is to insure expert attention that will prevent neglect and abuse and afford whatever care may be needed for the lubricating and ignition systems, brakes, springs, etc.

In the design of the trucks simplicity and accessibility have been sought to minimize the labor essential to good care, and when adjustments and repairs are needed. The assembly of the units is with the purpose of obtaining construction that will be uniform in strength, to insure against weaknesses that might be developed by continued service and in conditions where the use of maximum power, excessive loads and rough roads might possibly be combined for considerable periods. All moving contacting surfaces are large in area and are enclosed to protect them from abrasive action, while provision has been made to insure adequate lubrication.

Construction Units Are Standard.

The construction units include Continental engines, equipped with Bosch high-tension magnetos, Stromberg carburetors and Pierce governors, Fuller



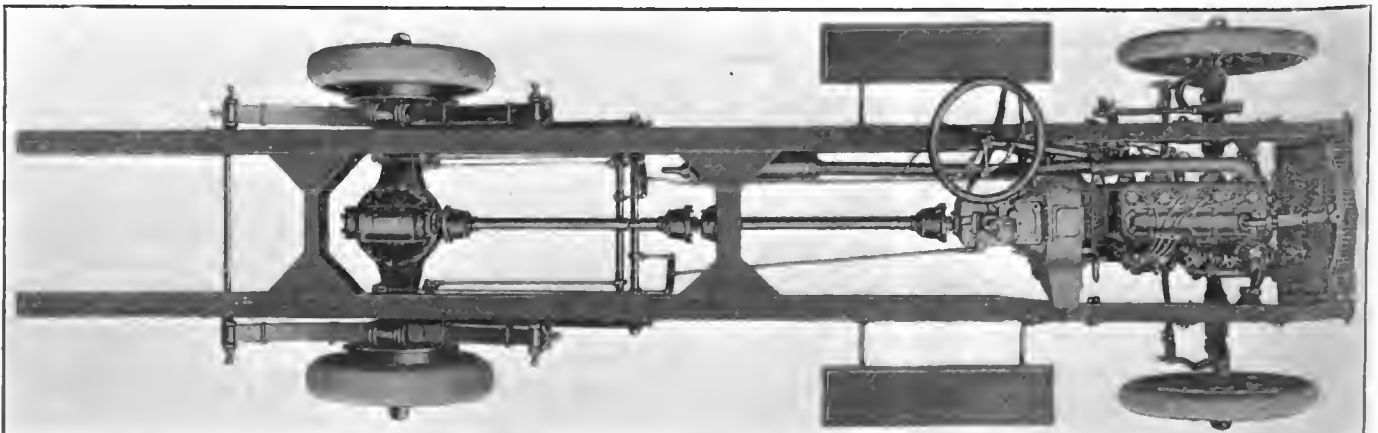
Rear of the Tower Chassis, Showing the Projecting Ends of the Frame Side Members and Large Top Gussets.

has impelled the use of components that are over-size as compared with those found in conventional practise. Statement is made by the company that the materials used in its machines are of proportions that one might find in vehicles of from 2000 pounds or more greater load capacity, and the exceptionally large factor of safety insures that there will be a decidedly greater resistance to stresses, corresponding reduction of wear and prolongation of service life.

The policy of the company is not to produce what is unknown or experimental, but to build machines that will have quality well established in the minds of all power vehicle owners. The company maintains that specialists build construction units that have been thoroughly proven by service, that are recognized

have been determined for the series will be in production. The company is now making deliveries of the two-ton chassis, the 3½-ton chassis will be ready for delivery by September, and shortly after this a five-ton chassis will be produced.

The plant of the company is new, has adequate equipment and facilities for producing five chassis a day, and a season's material is insured by contracts. In fact a considerable proportion of the construction units and parts are now in stock and dealers can be assured of deliveries at the factory practically to a schedule. Dec. 1, 1917, the management of the company was assumed by F. E. Davis, formerly of Detroit, and since then the capital has been doubled, a new series of chassis has been designed, and



Top View of the Tower Chassis—The Heavy Frame, the Unusual Location of the Cross Members and the Power Transmission System Are Clearly Shown.

multiple disc clutches, Fuller selective sliding gear transmission gearsets, Spicer universal joints, Detroit springs, Timken full floating worm shaft and worm wheel rear axle, Timken front axle, Ross steering gear, Timken brakes and Goodrich De Luxe tires. The design is conven-

and the flywheel. The lower section carries the oil reservoir below a horizontal web in which are the oil troughs into which the big ends of the connecting rods sweep.

Crankshaft and Camshaft Details.

The crankshaft is drop forged from

and the tappets are fitted in long renewable guides, and the tappets have adjusting screws and lock nuts. The valves are enclosed by cover plates that are quickly removable. The crankshaft, connecting rod and camshaft bearings are nickel babbitt, those of the crankshaft and camshaft being mounted in bronze cages and retained by brass screws. The connecting rod bearings are adjustable with steel shims.

Lubricating and Cooling Systems.

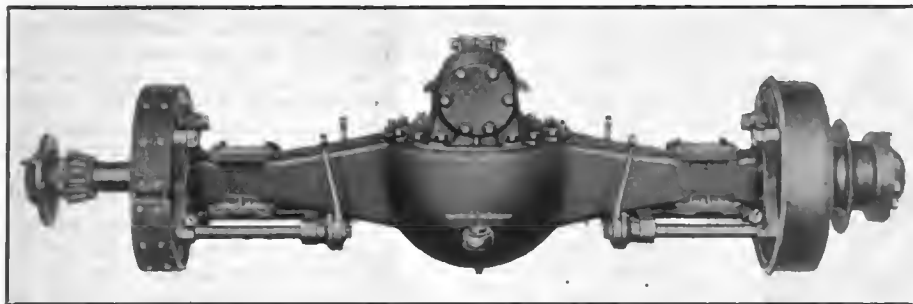
The engine is lubricated by a combination pressure feed and splash system, the oil being drawn from a screened well in the base of the engine case by a double plunger pump driven by eccentrics on the camshaft, which forces it through tube to the rear main bearing and the timing gearset. The oil then drains to the troughs in the crank case and is distributed by splash to the piston and cylinder walls, the front and center main bearings, the cams and the valve tappets. The camshaft bearings are lubricated from pockets cast in the walls of the crank case, and the wristpins from pockets in the upper ends of the connecting rods, in which oil is trapped.

The engine is cooled by a circulation of water forced through the cylinder jackets by a centrifugal pump and a large radiator with cast top and bottom tanks, with a finned tube core. The cooling section, tanks and side columns are assembled with bolts and may be disassembled in the event of necessary repair or cleaning.

The radiator is mounted so that it is protected from the stresses of chassis distortion. Radiation is insured by a large fan carried on ball bearings on an adjustable bracket on the front of the engine block and driven by a flat belt from a pulley on an extension of the water pump shaft. The engine is mounted on a trunnion on a yoke back of the front cross frame member, and on arms on the bell housing supported by the frame side members.

The Power Transmission System.

The clutch and the transmission gearset are a unit bolted to the rear of the flywheel bell housing. The clutch is a multiple dry disc type that is completely enclosed and it is so constructed that it requires practically no attention. The transmission gearset is a selective sliding gear type having three forward speed ratios and reverse, specially designed



Timken Rear Axle, Worm Driven, the Type Used in the Model F 2½-Ton Truck, Having Single Piece Cast Steel Housing.

tional, there being no detail of assembly that has not been proven by practice to be substantial and sound mechanically.

The following description applies specifically to the model F two-ton chassis, but it can generally be applied to the larger machines that are shortly to be built. The engine is a model C Continental, a standard type used very generally by truck builders, which is a four-cylinder, four-cycle, water cooled, L head construction, that has cylinder bore of 4½ inches and stroke of 5¼ inches. This is rated by the S. A. E. formula at 27.23 horsepower, but it is claimed to develop 37 horsepower at 1500 revolutions a minute, which is largely in excess of what would be required for normal service of the chassis.

Cylinders Cast En Bloc.

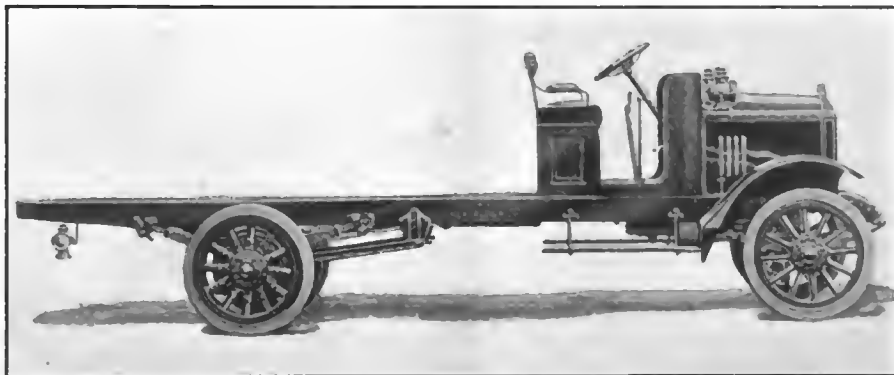
The engine cylinders are cast en bloc from fine gray iron with the water jacket integral, the top of the casting being open, which insures uniformity of the walls of the water chambers, perfect clearing of the passages and freedom of water circulation, and equality of temperature and a higher efficiency of lubrication. The cover plate carries the outlet manifold at the forward end. The base flanges are large and the end webs under the valve pockets form seats for the covers housing the valve mechanism. The castings are tested by water pressure before and after machining. The cylinders are rough bored and after ageing to determine distortion from machine stresses, are finish bored and ground. The pistons are the same material as the cylinders and are turned and ground to size. The pistons are grooved for three carefully fitted diagonally split concentric expansion rings, and have grooves on the skirts to distribute the oil thoroughly on the walls of the cylinders. The bores for the wristpins are made with special machines to obtain perfect alignment and accurate diameter. All pistons are weighted and balanced.

The crank case is a two-section aluminum casting, the upper being divided by a vertical transverse web that supports the center main bearing of the crankshaft, and both have forward and rear extensions that house the timing gearset

special alloy steel, with the flywheel flange integral, 1¼ inches diameter, with journals 2 9/16, three and 3 13/16 inches length from front to rear, a total length of 9 6/16 inches. There are flanges at either side of the center bearing to take the thrust. The crank pins are 2½ inches long. The camshaft is a steel drop forging with the cams integral, that is carried on three bearings. The crankshaft is heat treated and ground to size. The camshaft is rough machined, annealed, heat treated and finished ground on a special machine to insure accuracy of cam contour. The camshaft is so constructed that it may be withdrawn by removing the cover of the timing gearset.

The connecting rods are I section steel drop forgings that are heat treated and bored and reamed with special machines to obtain correct centers. The caps are retained by nickel steel bolts that are locked by special devices. The wristpins are hardened and ground steel tube that are locked in the piston bosses and oscillate in bronze bushings in the small ends of the connecting rods. The timing gears are helical cut, have large faces and much care is taken to maintain the accuracy of the gear centers. The set consists of crankshaft, camshaft, pump shaft and idler gears.

The valves have nickel steel heads electrically welded to carbon steel stems, the stem ends being hardened. The tappets are a mushroom type. Both the valves



Side View of the Model F 2½-Ton Chassis, the Long Frame, Flat Springs and Practically Straight Line Radius Rods Being Noticeable.

for heavy duty. The shafts are very large, of chrome nickel steel and are hardened and ground. The main shaft is $1\frac{7}{8}$ inches diameter over the spline keys. The gears are nickel steel, with wide faces. Both shafts and gears are heat treated. The hearings are all annular ball type, save that of the reverse gear, which is a roller bearing. The center control is a ball and socket type with positive interlock.

The power is transmitted to the rear axle by a two-section tubular shaft of large size, having three universal joints, the rear end of the forward section being mounted in a self-aligning annular ball bearing carried on a center frame cross member. The rear axle is a standard construction with the housing a single steel casting with a large central bowl, the cover of which carries the differential gearset and worm wheel below, and the tunnel for the worm shaft above the plate. This entire assembly may be removed in a unit from the axle housing by taking out the series of retaining bolts. The axle housing has heat treated nickel steel tubes extending from the outer ends close to the differential, which are supported by rigid reinforcing plates. The driving shafts are nickel steel, heat treated, and are splined at either end. The worm shaft is chrome nickel steel and the worm wheel is bronze. The worm shaft, differential gearset and the driving are carried on Timken roller bearings. The front axle is a steel drop forging, the wheel spindles being fitted with Timken roller bearings.

Frames an Unusual Type.

The frame is unusual construction, having two long side members and three cross members, which is shown in an accompanying illustration. The material is pressed steel channel section, seven inches width, with wide webs, the webs narrowing forward of the transmission gearset housing. The center cross member is approximately midway between the ends, but the rear cross member is ahead of the rear hangers of the rear springs, the ends of the side members extending back from this. There is no reinforcement back of this member other than the tie rod between the spring hangers. The frame is hot riveted and reinforced with gusset plates. It is suspended on semi-elliptic springs, the forward

set 44 inches long and $2\frac{1}{2}$ inches wide, 11 leaves, and the rear set 56 inches long and three inches wide, 14 leaves. The springs are self-lubricating and the eyes and the spring bolts of large size are lubricated by wick oilers. The relation of the rear axle is maintained by I section radius rods, carried on seats on the axle and having universal action at the hangers.

The wheels are wood, artillery type, shod with 34 by four-inch tires forward and 34 by seven-inch tires at the rear. The wheelbase is 146 inches and the tread $58\frac{1}{2}$ inches. The steering gear is a Ross construction, a worm and nut type, having fore and aft action, and the control is by the customary foot pedals for the clutch and service brake, hand levers for the ignition and fuel supply or the steering wheel, with hand levers for changing the speed ratios and the emergency brake. The brakes are internal expanding, the shoes operating within flanged drums on the rear wheels 16 inches diameter. The linkage is heavy and is fitted with automatic adjustment. The fuel is supplied from a 20-gallon tank located under the driver's seat.

The weight of the chassis is 4700 pounds and the length of the loading space is 144 inches. The company maintains a body building department and is prepared to supply standard types from stock or to build special types to specifications. The equipment consists of driver's seat, fenders, oil dash and tail lamps, tool box, mechanical horn, tool kit and jack.

SANFORD SOUTHERN SALES.

Announcement is made by the Sanford Motor Truck Co., Syracuse, N. Y., of the appointment of George Effros of Memphis, Tenn., as southern district sales manager. He will supervise the sale and distribution of Sanford trucks in Louisiana, Alabama, Mississippi and Tennessee.

The Wangler Co., 628-630 Tripoli street, Pittsburgh, Pa., manufacturer of automobile tops, seat covers and metal work, has engaged in the manufacture of bodies for vehicles for freightage purposes.

One Log Loads for GMC Tractor

Logging operations are often on a large scale, but few persons realize the size of logs that are frequently cut in the forests of the northwest and the Pacific coast, where the trees are mammoth as compared with those of the eastern sections of the country. In these timber lands, often long distances from railroads, much timber that is used for shipbuilding is cut, and in other parts of the country spruce trees are selected to obtain wood that is specially suited for the construction of airplanes.

Finding the timber is one thing and cutting it is another, but what is probably the greatest problem is getting the logs to railroads, or places where they can be manufactured in sufficient volume to meet the demands of the ship builders and the airplane factories. No statement has been made of the timbering operations, but thousands of men are employed in this work, and because of the power and dependability of power trucks and tractors they are used very generally for haulage instead of animals.

The accompanying illustration shows a GMC truck, used as a tractor, with a semi-trailer, hauling logs of such size that one piece of timber is a single load. The log is shown hoisted by a derrick for the semi-trailer to be moved under it, and the tractor and semi-trailer under way along a forest truck path. The weight of the huge fir log is not stated, but it measured 3880 feet, board measurement, and probably weighed three pounds to the foot, or between 11,500 and 12,000 pounds. This was intended for ship construction. The speed of derrick loading and tractor haulage as compared with any other equipment is obviously extremely economical, especially when the shortage of labor and the abnormal prices paid for it are considered.

The Donovan Motor Car Co., Boston, distributor of Studebaker cars and light trucks, has made contract to distribute Sanford trucks throughout New England, with headquarters at 626 Commonwealth avenue.



Logging in the Northwestern Fir Forests: At Left, Log Hoisted for Loading Semi-Trailer; at Right, GMC Tractor Hauling a Single Log Containing 3880 Board Feet as a Load.

Truck License Gain in Bay State

Judged by the issuance of the annual licenses for power trucks in Massachusetts there has been a very large gain as compared with the registration for last year, this conclusion being based on the record for the seven months from Dec. 1 to July 1. There is no reason to believe that there will be a very considerable increase during the remainder of the year, for owners obtain licenses as soon as the vehicles are made use of, but there is no question that the need of highway haulage will necessitate the purchase of more machines than in any previous year.

In the year ending Nov. 30, 1917, 21,974 trucks were registered, and July 1, 23,700 licenses had been obtained for freight vehicles, a gain of 7726, or more than 35 per cent. The gain has been very rapid comparatively, for in June 1922 trucks were registered, an average of 50 a day, and this was a gain of 55 per cent. as compared with the corresponding month last year.

Considering that practically all of the trucks are manufactured in the middle states and must be driven from the factories for delivery, the fact that the roads are now at their best will have some bearing on sales, for in the winter and spring buying was at its lowest point, for the cost of getting trucks to buyers was largely increased and prospective purchasers often deferred orders with the belief that conditions might become more favorable.

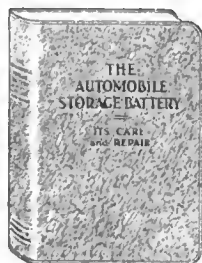
"THE AUTOMOBILE STORAGE BATTERY."

"The Automobile Storage Battery" is the title of a very comprehensive and authentic treatise on lead-acid electric secondary batteries, published by the American Bureau of Engineering, Chicago, which is in two sections, the first devoted to theory and practice and the second to repair and maintenance. The work is so written and illustrated that it will be a very great assistance to any one who has to do with electric batteries, whether an owner who desires to obtain the largest measure of battery efficiency at the least expense, the battery man who must repair and restore cells, or the owner of a station or garage who desires to afford satisfying service to his patrons.

No work of this character can give a man mechanical knowledge or experience, but practically any owner or mechanic can, by following the suggestions in the book, determine any condition that might obtain in normal use, and by reasonable care maintain batteries so that a much larger ratio of service, efficiency and life can be obtained. For those who are experienced with batteries, either use or maintenance, the book contains much information that will serve a distinctly useful purpose.

The book is systematically arranged

and it is illustrated with many half tone cuts from exclusive photos, made by a battery man of unusually wide experience. These present conditions clearly that might not always be understood from description alone. There are complete instructions relative to charging,



"The Automobile Storage Battery" Handbook.

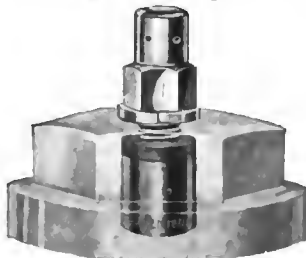
and the trouble chart is developed with reference to determining practically any cause for reduction of capacity or failure.

The book is admirably made up and printed on heavy paper, with tabulation of contents and index of subjects, and is bound with a flexible leather cover. It is obtainable from the American Bureau of Engineering, 1018-24 South Wabash avenue, Chicago, and the price is \$5.

IMPERIAL GAS TANK SEAL.

The wastage of gasoline through the vent in the filler cap of the fuel tank may appear to be so small as to be unworthy of consideration by vehicle owners, but when one understands that agitation of gasoline will cause it to volatilize, and the gas will fill the tank and escape through the cap vent to greater or less extent so long as the machine is driven, the possibilities for actual loss can be better realized. Of course the loss through volatilization varies with temperature and other conditions. Because no actual measurement of volume of loss can be practically made the saving that might obtain is uncertain.

Gasoline conservation was never so imperative as it is today, because of the war needs of the nation. Beyond this is the possibility of a war tax on fuel and consequent increase of cost. Statement is made that tests at the Armour Institute of Technology and the Associated Engineering Laboratories at Chicago have proven that fuel waste can be prevented by a valve that can be placed in the filler cap that will automatically admit air as required. The valve is



Imperial Gas Tank Seal.

known as the Imperial Gas Tank Seal. It is exceedingly simple and cannot become inoperative. It can be easily installed in a few minutes by simply boring a $\frac{3}{8}$ inch hole in the filler cap. Statement is made that fuel bills can be reduced from \$12 to \$40 a year and mileage increased by the use of the seal. It is the only device of the kind sold and is made by the Imperial Brass Co., 517 S. Racine street, Chicago. The price is \$3.

Automotive Show At Chicago

What is termed a national exhibition of power trucks, tractors and accessories will take place on the municipal pier at Chicago, Sept. 14-21, inclusive, under the direction of Automotive and Accessories Exposition, Inc. The pier is claimed to have the largest exhibition floor space in the world, and that there will be abundant space for all exhibitors to make full display of machines of any size. The floor space of the pier is divided into three sections, that for trucks to be 780 feet long and 68 feet wide, that for tractors 780 feet long and 68 feet wide, and that for accessories 720 feet long and 68 feet wide. The truck space can be increased if there is need to add to this section.

The first two days of the show will be known as "curiosity seekers' days," the third and fourth will be given over largely to visitations of hardware dealers, the fifth day will be Illinois day and the sixth and seventh the threshermen of Illinois, Wisconsin, Iowa, Indiana and Ohio will meet in convention in the auditorium, nearly a mile from the show.

According to Manager Buelow more applications for space have been received than there were exhibitors at the 1917 show at the Coliseum, and during the next two months this number will be considerably added to. The floor space already contracted for exceeds that of the Coliseum, which has been famed for the exhibitions held there.

The purpose of the management is to make the show a war-time demonstration of the efficiency of trucks and tractors, and the exhibitors have been asked to cooperate to whatever degree is possible to impress upon the visitors the possibilities for economies from the use of power vehicles and machines and implements. The publicity of the show is directed to the farmers especially. Various organizations have undertaken to cooperate in this work, and many interesting facts have been developed in connection with agricultural subjects that are worthy of attention.

The Frank E. Wing Co., which has for years been distributor for Marmon passenger cars in New England, with headquarters in Boston, has made contract with the Hurlburt Motor Truck Co. to distribute Hurlburt trucks in the same territory.

The Republic Truck of Boston, New England distributor of Republic trucks, now has 29 different representatives in Massachusetts, New Hampshire, Maine and Vermont.

A building 312 by 92 feet, four stories, is to be erected at the plant of the Globe Machine and Stamping Co., Cleveland, O., at a cost of \$125,000.

Warner Is Federal Production Manager

The initiative and foresight that developed the Federal Motor Truck Co., Detroit, into one of the best known and most successful concerns in the power truck industry has been directed to preparations for the increase of business anticipated because of a number of reasons.

Production of power trucks has become a problem of large importance in the industry, for with standardization of design by manufacturers economies of time and labor in large measure are practical through factory organization, equipment and system. During the past few months the Federal company has been making ready for the anticipated



Harry B. Warner, Vice President and Production Manager, Federal Motor Truck Co.

increase of business. New buildings have been erected and equipped, changes have been made in stock rooms, facilities have been increased and plans made to expedite production.

The company has made further provision for progression by the election of Harry J. Warner, for 12 years with the Continental Motors Corporation, and for six years its production manager, a member of the board of directors, a member of the executive committee and vice president of the company in charge of manufacturing. Mr. Warner's experience will be of very material value to the Federal company, for the Continental corporation is the large specialist in the engine industry in the world, and his knowledge of engines and engine building, especially what will serve for power truck construction, as well as factory facilities and methods, will undoubtedly lead to both quality and quantity production. The Federal factory output has doubled in the last year.

TRUCK TIRE SPECIALIST.

Mathey Bros. the Only Exclusive Solid Shoe Dealer in New England.

The business of Mathey Bros., 76 Cummington street, Boston, is unique in that it is the only one in the New England states confined exclusively to shoes for power trucks, and that it specializes service not obtainable elsewhere. The company consists of F. A. and Edward Mathey, both of whom for more than 15 years have dealt in tires, being associated with some of the leading manufacturers of the country, such as the Firestone, Kelly-Springfield and Gibney companies. For more than five years F. A. Mathey was the largest tire dealer in New Hampshire. The brothers sold tires when they were used exclusively for horse vehicles, and they have kept pace with the industry in its development.

The concern engaged in business less than a year ago in a small store in Sudbury street, Boston. The policy was to deal only in solid truck tires, to sell tires of all makes and types (standard shoes only) of highest quality, at extremely advantageous prices, and besides handling pressed-on, demountable, side flange, cushion, block or smooth treads, to specialize odd sizes and types that would be difficult to obtain through regular channels. The increase of the business was rapid and a store in Portland street was added. From less than 100 tires the stock increased to more than 3000 tires. This impelled leasing a new building erected at 76 Cummington street, which is now being equipped as a sales room, stock room, shipping room and service station. The purpose is to give a tire service day or night. In the service department is to be a 400-ton tire press, with which the largest tires made can be removed from and installed on wheels, and tires will be applied for any customer, no matter from whom purchased.

The machine equipment will be unusually complete and when operating the service department will make a specialty of changing truck tires from solid to pneumatic and will stock tires especially designed for changing truck equipment from pneumatic to solid tires. The work will be with a guarantee of satisfaction. The members of the concern will personally confer with truck owners or dealers with reference to the details of the sales proposition, which is new and decidedly attractive.

A. R. Grlach, W. C. Beuss, Charles Gorman, E. J. Weinsch and P. J. Grotty of Chicago have incorporated the Flame Spark Plug Co. to manufacture engines, ignition specialties and accessories for automobile vehicles. The capital is \$500,000.

The Aviation Section, Signal Corps, U. S. A., is the present address of L. E. Warford, who resigned as advertising manager of the Seattle branch of the B. F. Goodrich Rubber Co. to enter the service.

Conlon Now Acason Vice President

Harry A. Conlon, for about a year connected with the Acason Motor Truck Co., Detroit, as sales manager and assistant to Vice President J. F. Bowman, has succeeded to the position of vice president and director of sales of the company which Mr. Bowman has just resigned. Mr. Conlon has had wide experience, first being a salesman with an agency for Federal trucks in southern New England, meeting with exceptional success in dealings with different textile concerns. Later on he joined the Federal Motor Truck Co. as a district sales manager, and there began his association with Mr. Bowman, who was sales manager for that company. Later Mr. Conlon was made field sales manager and retired from that position to become sales manager of the Detroit Truck Co when Mr. Bowman resigned to go to the



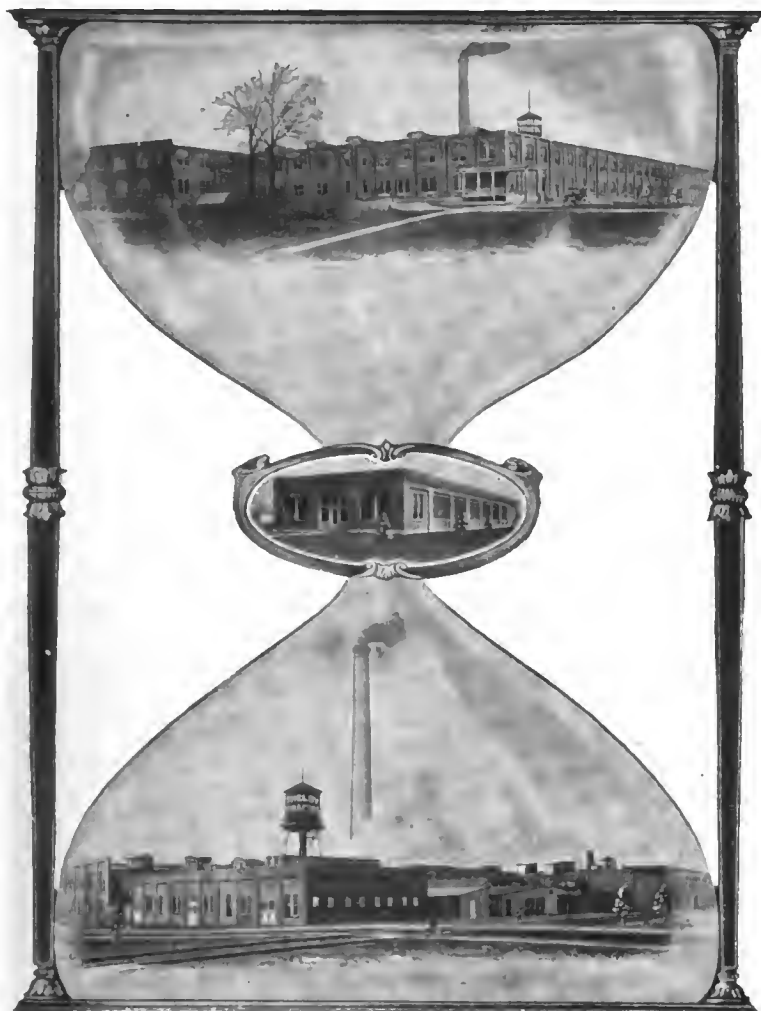
Harry A. Conlon, Vice President and Director of Sales, Acason Motor Truck Co.

Acason company as vice president and director of sales. Shortly after, however, he was induced by Mr. Bowman to join him as sales manager.

In announcing the election of Mr. Conlon Mr. Acason commented on the prosperous condition of the company and the unusually bright prospects, for during the past year the concern has made large progress, the dealer organization being greatly expanded and strengthened. Mr. Acason credits Mr. Bowman for the development of the company's distribution and the exceptionally satisfactory outlook commercially.

The advancement of Mr. Conlon has prompted the appointment of Donald F. Whittaker as assistant to Mr. Conlon in addition to his duties as advertising manager, and F. J. Chapin, service manager, has been brought into closer contact with the sales department. Both Mr. Whittaker and Mr. Chapin were associated with Mr. Conlon while with the Federal Motor Truck Co.

FIRST SHELBY TRUCK A ONE-TONNER



Two Views of the Recently Acquired Plant of the Shelby Tractor and Truck Co., Shelby, O.

HAVING acquired a large factory property and begun assembly of equipment with the purpose of beginning production as soon as the machines and tools shall be installed, the Shelby Tractor and Truck Co., Shelby, O., has become an active enterprise in the industry. The organization of the company has been progressing for several months, and it is now well established in every respect. The purpose of the company is to engage in manufacturing two types of machines for which there is known to be maximum demand. Each will be constructed to a standard design, and this will insure minimized manufacturing expense, the largest production possible with the factory equipment and simplify the service that will be essential to the satisfaction of owners.

The designs for a small tractor, a four-wheel type, driven by the rear wheels by bull gearing, to burn kerosene or gasoline, and to haul two plows in normal work, and for a 1500-pound truck chassis, have been completed, and these have been sufficiently proven to justify the company manufacturing them as quickly as the factory can be made ready for operating.

The Company's Directors.

The company has as its directors W. R. Kerr, formerly of the Weston-Mott Co., the General Motors Co. and the Chevrolet Motors Co.; Sidney E. Fell, president of the S. R. Fell Co., president of the Cleveland, O., Salt Co.,

and president of the Fell Manufacturing Co.; W. J. Bailey, formerly of the H. F. Beach Co., Coshocton, O., an expert in national advertising and sales organization; Henry Wentz, director of the Citizens' Bank, Shelby, O., secretary and treasurer of the Mutual Plate Glass Insurance Association and director of the Shelby Building and Loan Association; D. M. Doty, director of the Shelby Building and Loan Association and the Standard Manufacturing Co.; D. K. Moore, formerly sales manager of the Weston-Mott Co., Flint, Mich., and now sales manager of the bearings and axle division of the Standard Parts Co., Cleveland, O., and William M. Byrnes. W. R. Kerr is president, S. R. Fell vice president, W. J. Bailey secretary and Henry Wentz treasurer.

Has Bought \$350,000 Plant.

The company has purchased the property of the Shelby Electric Co., a plant valued at \$350,000, and it is now erecting a structure that will be used for tractor manufacture, for the company has a government contract to produce munitions, which work is now under way in one of the other buildings. The factory site consists of three acres of land, on which is a two-story brick structure with a basement under a part of it, there being approximately 120,000 square feet of floor space. The main building is 300 feet long and 60 feet wide, with two wings. In addition there is a large power house equipped with a 350 horsepower Corliss engine, a battery of three boilers that can be used independently or in series, two dynamos, which operates a lighting system, and a heating plant. The entire factory is equipped with a sprinkler system and is well protected against fire. The building is modern and has exceptionally good lighting, ventilation and sanitary conveniences, including shower baths for the employees. The offices are well finished and arranged with a view of obtaining clerical efficiency. The plant is located on a siding of the Baltimore & Ohio railroad and can be



Model S35 Truck Chassis Equipped with a Flareboard Express Body with a Four-Post Standing Top and Full Running Boards and Fenders.

reached by the Shelby and Mansfield electric line. On two sides of the property are paved streets.

Capital Stock in 100,000 Shares.

The company has issued 100,000 shares of stock, 30,000 of which are preferred and 70,000 common, of par value of \$10. The preferred stock is cumulative and the dividend is specified as seven per cent. The preferred stock holders are not only preferred as to dividends, but in the event of the distribution of the assets of the company are entitled to preference to the extent of the par value of their holdings and all dividends accrued and unpaid thereon, before any amount shall be payable to the holders of common stock. The redemption of the preferred stock is not optional with the company until three years after the date of issue, and then only by paying to the preferred stockholders the par value of the stock and all accrued dividends.

The Tractor a Light Type.

The Shelby tractor is built for heavy duty, having as a power plant a four-cylinder Waukesha engine that will burn gasoline or kerosene, which is equipped with a Kingston carburetor and a Splitdorf magneto. The weight of the machine is approximately 3000 pounds. The transmission gearset is a Foote construction, designed for tractor service. From this there is a power take-off to drive the belt. The front axle is a bridge type with steering knuckles and the alignment of this is preserved by triangular radius rods centered under the main frame. The steering gear is an automobile type. The entire mechanism of the tractor is enclosed with a hood extending from the radiator ahead of the engine back to the seat of the driver. The driving wheels are wide faced and are cleated when used for field work.

Shelby Model S35 Chassis.

The Shelby chassis is known as model S35. The construction follows conventional practise, it having a four-cylinder, water cooled, four-cycle, L head, vertical engine, having cylinder bore of $3\frac{1}{2}$ inches and stroke of $4\frac{1}{2}$ inches, the rating by the S. A. E. formula being 19.60 horsepower, but it is claimed to develop 29 horsepower at maximum capacity. The cylinders are cast en bloc. The engine is cooled by a thermo-syphon circulation of water through the cylinder jackets and a large rimmed tube radiator de-

signed for truck service, and by a fan driven by a flat belt from a pulley on an extension of the camshaft. The lubrication system is a combination of pressure feed and splash, that carries a spray of oil to all internal moving parts. The manifold is constructed with a "hot spot" to increase the gasification of the fuel and to obtain the greatest operating efficiency from the fuel. The carburetor is a Zenith, with the air taken from a stove on the exhaust pipe. The fuel is supplied from a 15-gallon tank under the driver's seat through a vacuum system of feed. The source of ignition is a Dixie high tension magneto. The engine is suspended on three points to protect it against the strains of chassis distortion.

Other Chassis Details.

The clutch is a Borg & Beck single dry disc construction, 10 inches diameter, that is enclosed and requires practically no attention. The transmission gearset is a Detroit selective sliding gear type, having three forward speed ratios and reverse, that has large, wide-faced nickel steel gears mounted on nickel steel shafts in annular ball bearings. Both the gears and shafts are heat treated and have exceptional endurance. The power is transmitted to an internal gear drive rear axle through a large tubular shaft with a universal joint at either end. The shaft is $1\frac{1}{4}$ inches diameter and is rated to transmit a full ton with an ample factor of safety.

The front axle is an I section steel drop forging with heavy steering knuckles, the wheel spindles being fitted with Bower roller bearings. The frame is built of pressed steel channel section, four inches wide, with two-inch webs, with numerous cross members, gusseted and reinforced, that tapers from the front to the rear. The material is $\frac{3}{16}$ inch thick. The frame is suspended on semi-elliptic springs, the forward set being 38 inches long and two inches wide and the rear set 50 inches long and $2\frac{1}{4}$ inches wide. The wheels are wood artillery type, having 12 spokes $1\frac{1}{4}$ inches diameter, that are shod with 32 by four-inch pneumatic shoes. The wheelbase is 110 inches and tread 56 inches.

Electric Starting and Lighting.

The control is by a Gemmer steering gear with heavy linkage at the left side, with the conventional control levers and pedals. The chassis has Dyneto two-unit

starting and lighting system. The brakes are external contracting and internal expanding on and in drums that are 14 inches diameter and two inches wide. The weight of the chassis is approximately 2400 pounds. The equipment includes driver's seat, electric head and tail lamps, speedometer, ammeter, oil gauge, windshield, fenders, full length running boards, tool kit, spare rim, tire pump and jack.

The body length back of the driver's seat is 80 inches, and when fitted with an express body the width is 42 inches; when fitted with a four-post standing top the height is 54 inches from floor to the roof, and the dimensions of the full panel body are the same. The express body may be fitted with flare boards. The chassis will be equipped with any one of the bodies specified as standard equipment when so ordered, or the owner can have bodies built to specifications that will best serve his requirements. The standard colors of finish are red chassis and black body, but these can be varied as a special order.

NOBLE MOTOR TRUCK PLANS.

The Noble Motor Truck Co., Kendallville, Ind., has developed plans for factory facilities and production that are essential to the general scheme of expansion, and unless obstacles not anticipated are met the concern will be located in its new plant before cold weather. Plans for a building 192 by 100 feet, having 19,200 square feet of floor space, have been determined and specifications are being prepared for contractors' bids. This factory will be equipped with every facility for efficient and economical manufacturing.

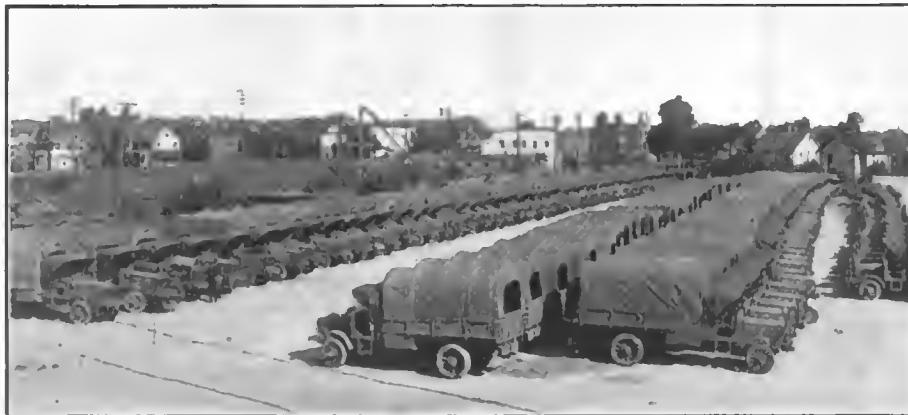
The company is now building a $2\frac{1}{2}$ -ton truck that is sold for \$2675, and it is developing $1\frac{1}{2}$ -ton and four-ton chassis, which will be produced commercially in a very short time. The designs have been practically completed and the experimental work has so far advanced that the company is willing that the statement shall be made with reference to the proposed new product.

SCHARON JOINS HYATT BEARING CO.

The advertising department of the tractor bearings division of the Hyatt Roller Bearings Co., Chicago, has been placed in charge of William A. Scharon, who was formerly connected with the advertising departments of the Packard Motor Car Co. and of the Timken-Detroit Axle Co., both of Detroit.

The distribution of Menominee trucks in Chicago and vicinity is now done through the Chicago Commercial Truck Co., which has succeeded the Menominee Motor Sales Co.

Announcement is made by the Fulton Motor Truck Co., Farmingdale, L. I., that on model FX Fulton trucks the magneto equipment will in future be Simms instead of Dixie.



A Fleet of Army Trucks Built at the Plant of the Selden Motor Vehicle Co., Rochester, N. Y., Assembled in Readiness for Shipment.

Roedding Signal Tail Light

REGULATION of highway traffic is for the purpose of protecting the public, for there is equal need of safeguarding those occupying vehicles or those using the streets or roads as pedestrians. Generally speaking all persons, whether driving or on foot, have a responsibility—that is, they must exercise reasonable care to avert and avoid danger. Practically all states or municipalities that enact regulatory measures require the use of two front lights that are visible a short distance, but drivers of power vehicles understand that their own safety impels the use of lamps that will project rays hundreds of feet, and so great is the power of head lamps that they are a menace because of their dazzling the sight of those upon whom they are directed. Many states now require dimming devices or the projection of the light rays so that they will be below the line of vision of those walking or riding.

Strange as the statement may appear there has been no attention directed to the safeguarding of vehicles from others overtaking them, either moving straight ahead or turning into intersecting ways or private drives, or when stopping. Seemingly there is supposition that the illumination of the head lamps is sufficient to prevent danger. No code of uniform road signals exists and custom has accepted as valid hand signaling for those following when a stop or a turn is to be made. This may serve indifferently during daylight, provided that it can be always seen, but this method absolutely fails at night. Not only this, vehicles are very generally used with the tops up, and if they have enclosed cabs or bodles signals cannot be seen clearly and cannot be depended upon.

With well nigh 6,000,000 vehicles, of which perhaps 500,000 are used for freightage on the highways, the dangers are multiplied. This statement is especially applicable on all streets and the highways radiating from commercial centers. No driver can rely upon meeting every emergency. The majority have supreme confidence, but the traffic accidents, which number thousands each year, and are increasing, prove that better means of rear end protection are necessary. The use of the highways is more and more essential, especially for freight trucks. Too great care cannot be exercised.

A signaling device intended for installation on the rear of any vehicle is known as the Roedding signal tail light, and this is placed where it can be seen when one approaches behind. It consists of a water and dust tight cylinder of metal 10 inches long and four inches diameter. Within this is a drum mounted on a shaft that is actuated by an electric current through a battery connection—either the starting or lighting battery or a battery of dry cells. On this roller are in letters nearly two inches

height the words "Right," "Left," "Back" and "Stop," and as the cylinder is illuminated by an electric lamp any one of these words is shown at will, or a plain red light is displayed when the machine is to continue without change of direction or speed. The signal weighs $2\frac{1}{2}$ pounds and can be installed by any person without mechanical experience or special tools.

The control is by a small switch mounted on the steering wheel, which is also connected with an electric horn. When the switch button is pressed the horn is sounded, either with or without the signal. When moved forward, backward, right or left, the signaling cylinder is rotated within the tube, and it can be seen plainly 100 yards. Obviously, the signal serves equally well by day or night. The device was first patented in 1913 and it is now covered with five basic patents. The simplicity of the signal and its utility were realized by K. C. Barkoot, 1010 Chamber of Commerce building, Detroit, who has the sales rights for the United States, and is now developing a national distributing organization.

"THE FORGOTTEN COUNTRY."

"The Forgotten Country" is a capital little story that appeared in a recent issue of "The Quaterion," published by the Hyatt Roller Bearing Co., Detroit, and written by B. G. Koether. It is dedicated to the "Motor Truck Salesman" and begins and is concluded with quotations from Kipling's "Overland Mail," which is appropriate because the theme is of that poem and the memories it recalls of Weaverville, Cal., "the forgotten country," evidently familiar enough to writer, but perhaps never heard of by the reader. Weaverville was forgotten by the Southern Pacific railroad when its tracks were constructed, and for years it was only accessible by an eight-horse team that drew a heavy wagon that carried freight and supplies and mail.

But a motor truck salesman saw the possibilities of reaching Weaverville with a truck, lessening the round trip from seven days to 11 hours, and reducing the expense from \$98 to \$25. An advertisement for a truck salesman caused the writer to point out that the advertiser was "offering an opportunity to go out

into the highways and byways of big business and preach the gospel of better haulage, lower cost and quicker and more efficient work. A gospel that means as much to civilization as any gospel that has ever been preached by missionaries of old, and let none say nay. When you send a man out into the country districts and he shows the small merchant there how that merchant can serve a bigger territory, you are advancing civilization.

"When you send a man out into the great farming country and you show how produce can be moved into the markets by starting at 5 o'clock in the morning instead of 7 the night before, you are serving mankind. When you demonstrate to a man of big business how all his goods can be delivered and the trucks back in the garage by 6 o'clock, rather than man and horses working all night, you are a public benefactor. When you show how all business in these times of trouble and stress can be speeded up through the use of your product, you are earning for yourself a place in the economies of business from which nothing can dislodge you."

The thought that is most impressed is that the "forgotten country" was brought into close contact with the railroad and with civilization, because the motor truck, through all seasons, carries the supplies and mail. What the motor truck did for Weaverville it can do for other communities, for all business. What is necessary is the salesman who can make the most of his opportunities.

ROGERS BROS. TRAILERS AT HOG ISLAND YARD.

In a recent article published in **MOTOR TRUCK** statement was made that with the fleet of Acason tractors and trucks used for construction work at the Hog Island ship yard a considerable number of four-wheel Troy trailers were utilized for heavy haulage. This was based on erroneous information so far as the make of trailers was concerned, for these were not Troy, as stated, but Rogers Bros. Every other statement made, however, was correct. Claim is made that Rogers Bros. is the only company that supplied trailers for Hog Island that received repeat orders, the first fleet proving so satisfactory in service that the original number was considerably increased.



One of the Five-Ton Federal Trucks Operated by the Weaverville Stage Co., Between Weaverville and Redding, Cal., Over Mountain Roads.

Giant Grip Chains for Truck Use

FREIGHT trucks must be used daily, no matter what the weather or the road conditions. The value of the power vehicle is largely its utility—that it can be driven wherever there are roads—but



Steel Wheel with Round Spoke with Giant Grip Chains Attached, Showing Adaptability of This Equipment.

the one great necessity is traction. When highways are dry the greatest degree of power delivery is obtained, but if the tires are not on hard, unyielding surfaces, then wheel slippage results in varying degrees.

Accumulations of dust on roads, surfaces that crumble under the combined weight and tractive effort, as dirt, sand or whatever has not solidarity, will result in loss of traction and whenever one wheel of the two-wheel driven truck slips there is power loss and the danger from lack of control. What has been stated applies equally well to roads or streets that are wet from sprinkling or from rain, from mud, from ice or snow.

The differential gearset (very few differentialless rear axles are used) is believed necessary by most constructing engineers, and this means that when there is loss of traction by a single wheel the vehicle is more or less uncontrollable, depending, of course, upon the weight and speed of the machine and its load and the condition of the highway. One of the most dangerous results from absence of control is "skidding," because this cannot be anticipated sufficiently to prevent it, and skidding will happen despite the greatest care in driving unless the wheels are equipped so they will have positive traction.

This protection is obtainable in Giant Grip chains, manufactured by the Chalmers Co., Oshkosh, Wis., an equipment designed especially for power truck use, in different sizes and types to fit practically all forms of wooden and steel wheels, either spoked or disc. Though wheel chains may seem to be very similar in general, Giant Grip chains have numerous features that very much enhance their value from a protective and utility point of view.

One of these qualities is that the chains cross the tread of the tire, being held loosely, so that the wear is over a

considerable surface area, by clamps secured to the spokes, rims or discs. Another is that the cross chains may be put on or removed from any one wheel in two minutes without jacking, no matter what the condition of the roadway. A third quality is that no tools are required. A fourth is that the chains are adjustable as to length. A fifth is that the breakage of one chain does not materially lessen the degree of protection.

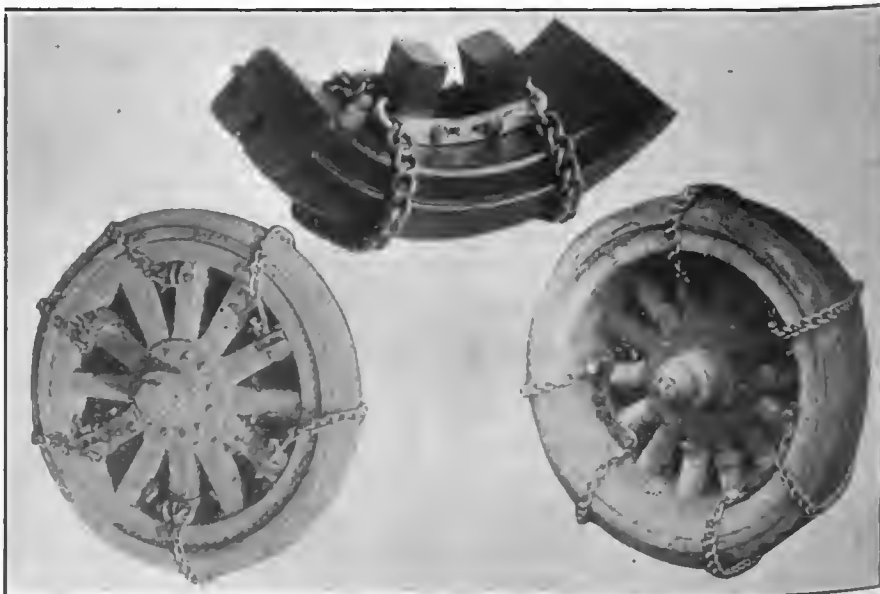
in the clamps or the bolts retaining the clamps, the weight and position of the chains holding the hooks locked. The chains cannot be loosened, no matter what the movement of the wheel or the stress upon the cross sections, for stresses only serve to make the locking more positive. Yet the chains can be removed with great rapidity whenever required.

The permanent clamps and the detachable chains are a very large insurance, because the chains can always be carried in small space, even in a tool box, and they can be put on without labor or tools whenever there is any need for insuring traction, even where there is a soft surface to be driven over a short distance. When not wanted they can be removed as easily, which means that there may be minimum wear of both tires or chains, yet the greatest degree of safety.

The chain sections are made with curb links at the centers and straight links at the ends, this insuring flat surfaces against the tire treads. The chains are made with drop forged links, heat treated, and the clamps, eye bolts and connecting hooks are drop forked from special analysis steel, heat treated, and all parts are thoroughly rust proofed. The accompanying illustrations show the chains and different type clamps, designed for differing wheel construction, and also a spoked steel wheel of a truck equipped with Giant Grip chains.

The Guarantee Automobile Exchange, Philadelphia, Pa., of which W. J. Robertson, Jr., is president, has been made distributor of Lane trucks in Philadelphia territory according to an announcement by L. W. Hamilton, general manager of the Lane Motor Truck Co.

The price of the model 90 delivery wagon, with express body, has been increased from \$840 to \$875; the model 90 with panel body from \$865 to \$895, and the 1200-pound delivery wagon from \$975 to \$1075 by the Willys-Overland Co.



Giant Grip Chains Attached: Above, Side Clamp for Square Spoked Wheel; at Left, Square Clamp for Single Spokes; at Right, Side Clamp on Round Spokes.

STANDARD ARMY TRUCKS AND CARS

STANDARDIZATION of freight truck and passenger car chassis for army service has been completed; according to a statement issued by the War Department at Washington, which also included the fact that more than 75,000 vehicles of all kinds have been purchased by the department for the different branches of service. While thousands of vehicles are utilized in this country, a very large part of the units will be utilized by the services abroad, principally in France, but possibly in Italy and elsewhere where the United States troops will operate.

When war with Germany was declared the government bought trucks for immediate needs from a number of manufacturers and made contracts for future deliveries, and with the cooperation of the Society of Automotive Engineers and the War Department began the development of standardized trucks. These designs were completed, the purpose being to build them in different motor truck plants from parts produced by specialists, and they were designated as class B, army rating three tons, commercial rating five tons; class A, army rating 3000 pounds, commercial rating three tons, and class AA, army rating 1500 pounds, commercial rating 3000 pounds. The reduction of commercial rating was to establish what would be safe loads in army service, which would be without reference to good roads.

The expectation was that these machines would be standardized and that no others would be utilized by the army aside from those that had been purchased prior to the adoption of the standard designs. The announcement of the War Department appears to have standardized commercial designs, with certain modifications with regard to both trucks and cars, although retaining the class A and class B trucks. According to the statement the class AA truck for army service will be the GMC 2000-pound truck chassis, which is rated at 1500 pounds, the principal change being in spring construction, which has been changed so that these chassis may be used for light freight haulage and for ambulances of large capacity. The War Department bought a considerable number of these for ambulances shortly after war was declared and the statement was made, though not officially, that this has been adopted as the standard ambulance chassis of the army. The choice of the GMC chassis was based on light weight and the economy of materials, small consumption of gasoline and satisfactory results obtained in Mexico and France. The order for the department is stated to be about 7000 machines.

The class A truck selected is the White, which was chosen from three makes that remained after a series of tests continuing a month conducted by the Engineering Advisory Board. The board made report that the three machines were equally serviceable, but the White was preferable because of smaller

fuel and lubricant consumption, the satisfaction obtaining when used in Mexico and France, and that it was especially adapted for high speed when equipped with pneumatic tires for fast truck, staff observation and reconnaissance service. The cost of spare parts was another factor of importance, the total expense for parts to assemble a machine being approximately that of a chassis complete, which was lower than the cost for spares for the other makes tested.

The especially designed class B truck was selected for the service after a series of tests made with it and other makes of trucks of approximately equal load rating, with recommendation of certain minor changes. One of the principal reasons for this choice was maintenance, and the fact that 18,000 machines had been ordered, 10,000 of which will be completed by Sept. 1 and the remainder by the end of the year. These are being assembled by different manufacturers from parts provided by the government.

The four-wheel driven truck developed by the Ordnance Department, known as class TT, is designed for use principally as a tractor, and statement is made that this was chosen after thorough tests of several machines built to designs that appeared to be the most practical. Determination was based on reports from Gen. Pershing of the service obtained with machines now in use in France, and information that as soon as the class TT chassis could be tried in actual service report would be made of its utility and the advisability of producing it in numbers. According to observers of the trial of the class TT chassis it has great power, especially adapted for haulage of heavy artillery off of roads and can be utilized for work that would not be practical with any other type chassis. This machine is rated at three tons load capacity.

A statement is made by the War Department that the rejection of trucks that were tested was not condemnation of them for commercial and industrial uses, for which they were designed and are adapted, instead of for the extremely heavy work and rough usage they would be subjected to in army service.

The Ford chassis was accepted as a standard for army uses for passenger, light ambulance and fast light freighting, because of the request of Gen. Pershing for additional machines of this make, and that there were approximately 3000 Fords in use as ambulances in France. Gen. Pershing asked that this number be increased to 8000. The Ford Motor Co. made contract for 5000 trucks, production of which was begun July 22 and is now being filled at the rate of 200 a day. Low cost of operating, ease of making repairs, the certainty of delivery in limited time because of standardized production and the extremely small initial price, were some of the factors influencing the decision, the comment being made that "it can be used where most other motor vehicles cannot."

The decision of the board was that the Dodge and Cadillac chassis now being built for the army best meet its needs for passenger car service, and the continuance of the production as standard types was determined. These are not the chassis sold commercially by the Dodge and Cadillac companies, but are special machines that can be built in other factories if there shall be need of producing them in large numbers.

OAKLAND TRUCK COMING.

The Oakland Motor Car Co., Pontiac, Mich., one of the General Motors group, which has built from 15,000 to 20,000 passenger cars annually, is to produce trucks on a large scale. The engineers have developed a chassis having one ton load rating, that will have 130 inches wheelbase, with a Northway engine having cylinder bore of 3½ inches and strokes of 5½ inches. The chassis will be equipped with a Remy ignition, starting and lighting system and electric dash and tail lamps. The wheels will be shod with solid tires, 34 by 3½ inches front and 34 by five inches rear. The engine is rated by the manufacturers at 40 horsepower, but the S. A. E. formula rates it as 19.60. The production of the chassis will be begun within 90 days, for the experimental work on the design is practically completed.

NASH CALLED TO AEROPLANE PRODUCTION.

Charles W. Nash, head of the Nash Motors Co., Kenosha, Wis., which concern has been engaged for months in power truck building to fill government orders, has been summoned by John D. Ryan, director general of aircraft production, to be his assistant in producing airplanes. Mr. Nash was president of the General Motors Co. during the time that concern was controlled by a voting trust established by a committee of bankers. When the committee relinquished control of the company Mr. Nash retired and bought the Thomas B. Jeffery & Co. plant at Kenosha and reorganized the concern as the Nash Motors Co. He is regarded as an exceptionally efficient manager.

GENERAL MOTORS EXPANSION.

A new foundry for the production of automobile castings is to be built by the General Motors Corporation at Saginaw, Mich. The first unit of the plant will consist of a foundry building 163 by 440 feet, a core building 100 by 400 feet, a cleaning shop 110 by 265 feet, a pattern shop and storehouse 100 by 120 feet, with a power house and a sand storage building. Other units will be added later. The cost will be about \$1,100,000.

The Stegeman Motor Car Co., Milwaukee, Wis., has appointed L. L. Newton its general manager.

ALL-AMERICAN 2000-POUND TRUCK

WHAT is defined as the "All-American Idea" has been adopted as the policy of the All-American Truck Co. of America, organized at Chicago, and which is now actively preparing for production of a machine that is referred to as the "super-truck" by the officials of the company. According to the statement of the company the purpose is to apply the "all-American idea" to all its operations, maintaining that it is intensely patriotic and is the inauguration of "the practical demonstration of a splendid principle."

In effect the application of the policy comprehends the following:

Only American citizens will be employed.

Only units and parts made in America will be used in the manufacture of trucks.

Only naturalized American citizens will be included in the sales organization and dealers' contracts will be made only with native or naturalized American citizens.

The operations of the company will be through and with American citizens only.

Until the end of the war All-American trucks will be sold for service directly connected with the general war program.

The executives of the company maintain that not only is this the first policy of a patriotic character established in the power truck industry, but it is the first in any industry, and it has been assured unlimited support by leading interests in the trade; that there is abundant reason to believe it will be approved by leading corporations and have the indorsement of commercial associations throughout the country.

The company is stated to have abundant financial resources and it now has a factory that is being equipped to have large production capacity. It is a three-story structure at Sacramento boulevard and Chicago and Grand avenues. The preparations for manufacturing have reached a stage where definite announcement can be made. Coincident with the development of the operating plan a sales organization is being created, so that the company will have established representation in a considerable number of commercial centers when production shall be begun. This will be extended as broadly as the demand for the truck develops. The purpose of the company is to inaugurate an aggressive sales campaign, and it is prepared to expand its factory facilities to whatever extent may be necessary.

Personnel of the Officers.

The president of the company is R. H. Spear, who was organizer of the Scripps-Booth Co., Detroit, which was a notable success under his management, the business for the first 11 months exceeding \$2,000,000. He was manager for the Gramm-Bernstein Co., Lima, O., and leading Detroit banks retained him to systematize the operations of several



R. H. Spear, President of the All-American Truck Co.

large manufacturing concerns in that city, his endeavors developing them into profitable enterprises. He is well known as an author of works on business organizations and scientific management.

Robert J. Sutton, vice president in charge of manufacturing, was formerly production manager for the Four Wheel Drive Auto Co., Clintonville, Wis., at which plant under his direction trucks were built for the United States government and for the English war office for use in France. Mr. Sutton has devised and established efficiency, premium labor and high speed production systems at the plants of the Westinghouse Electric and Manufacturing Co. at Pittsburgh, the National Brake and Electric Co. at Milwaukee, Wis., and several other concerns nationally known.

The treasurer of the company is Glenn W. Barden, for five years secretary and treasurer of the Kelly-Springfield Motor Truck Co., Springfield, O., who has been associated with Price, Waterhouse & Co.,

certified public accountant, and also has been a representative of the United States government at the plant of the Packard Motor Car Co. at Detroit.

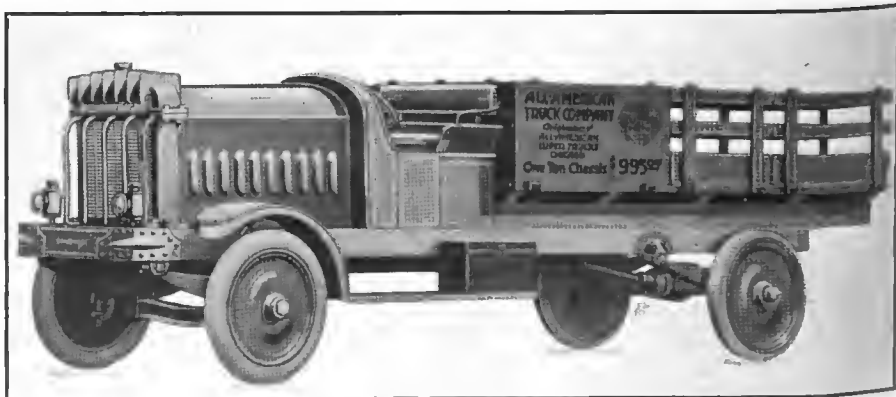
Model A "All-American Chassis."

The company's first production will be known as model A chassis, having load rating of 2000 pounds. The power plant will be a four-cylinder, four-cycle, water cooled, L head engine, with the cylinders cast en bloc. The cylinder bore will be $3\frac{1}{4}$ inches and the stroke five inches, having a rated horsepower of 16.90 by the S. A. E. formula. The claim is made that this engine will develop 43 horsepower and that it can be practically operated with kerosene fuel as well as gasoline. The engine will be mounted at three points in the chassis. It will be cooled by a thermo-syphon circulation of water through the cylinder jackets and a radiator of standard truck design, with finned tube cooling section and cast tanks and case, and by a 16-inch fan driven by a flat belt that will be adjustable. The engine will be lubricated by a combination force feed and splash system that is thoroughly efficient and dependable. The source of ignition will be a high tension magneto. The carburetor will be a type designed especially for truck service and fed by gravity from a 12-gallon tank located under the driver's seat.

The clutch will be a multiple dry disc construction, fully enclosed, that will not require lubrication and will need no attention save at long intervals. It can be easily adjusted and is very accessible. The transmission gearset will be assembled as a unit with the clutch and the engine and is a selective sliding gear type, having three forward speed ratios and reverse. The shafts and gears are large and enduring and the shafts are mounted on heavy bearings.

Other Construction Details.

The power will be transmitted through a large tubular shaft with universal joints at either end to an internal gear driven rear axle of large capacity, the gear reduction being 6.5:1. The front axle will be an I section steel drop forging fitted with heavy steering knuckles. This axle is a special type designed for



Model A "All-American" 2000-Pound Truck Chassis, Equipped with Rack Platform Body and Steel Disc Wheels.

truck service. The frame will be of pressed steel channel section, of 5/32 stock, five inches wide with wide webs, having the cross members strongly reinforced and gusseted. The construction will be what is known as semi-flexible and it is maintained to be extremely enduring in service.

The frame will be mounted on semi-elliptic springs, made for truck construction, the forward set being 38 inches long and two inches wide, and the rear set 54 inches long and 2½ inches wide. The drive will be through the springs. The wheels will be wood, artillery type, 12 spokes, 1¾ inches diameter forward and 1½ inches diameter rear, which will be shod with 32 by 3½ pneumatic tires at the front and with 34 by four-inch solid tires at the rear. When desired the chassis will be equipped with steel wheels at an additional cost. The wheelbase will be 130 inches and the tread 56 inches.

The control will follow conventional practise, the steering gear being a worm and nut type, located at the left side, with the gear shifting and emergency brake levers in the center of the foot-board. The hand wheel will be 18 inches diameter. The brakes will be external contracting and internal expanding on and within large drums on the rear wheels. The chassis weight will be 2750 pounds. The chassis will be sold with driver's seat, front fenders, running boards, oil dash and tail lights, warning signal, tire repair kit, jack and set of tools. The colors of the finish will, in keeping with the name, be red, white and blue. The chassis will have the standard warranty of the National Automobile Chamber of Commerce.

WILL BUILD MACHINE TOOLS.

The Schwegge & Wilt Manufacturing Co., Detroit, which is one of the largest manufacturers of automobile rods of the industry, has purchased the Wilt Engineering Co. of that city and has engaged in the manufacture of machine tools. The Wilt Engineering Co. developed several new tools for which a considerable demand quickly obtained. The Schwegge & Wilt Co. has taken over this business and a large part of the equipment. It has installed additional machine facilities and greatly enlarged its production department. The orders for the special machines will, however, necessitate operating to capacity for a number of months and for that reason the manufacture of standard tools will not be engaged in for perhaps a considerable period.

The company will continue the production of its original specialties, rods used in power vehicle chassis construction, such as reach, radius, torsion, tie and brake rods, as well as rods that are used in airplane construction. Statement is made that more than 50 per cent. of its production is to government orders. The plant of the company, constructed for its manufacturing needs, is said to be one of the best of the kind in America.

RAILROAD OPERATES TRUCKS.

San Diego and Southeastern Collects and Distributes Freight.

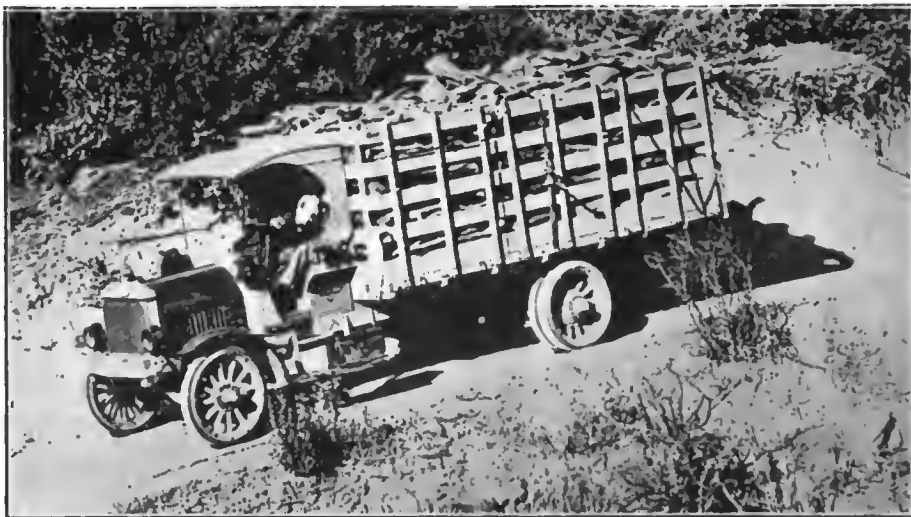
The San Diego & Southeastern Railroad, one of the transportation lines of southern California, is now operating trucks to supplement its regular service in collecting and distributing freight, reaching business that was previously obtained intermittently and considerably increasing its revenue. For nearly a year the company has used two Federal trucks, which are driven as far as 50 miles from the stations, extending the service and adding materially to its revenue. This combination of railroad and highway freightage has worked out surprisingly, and there appears to be no reason why the plan could not be adopted by other railroad systems, no matter where operated, with at least equal success.

The truck shown in the accompanying illustration is used principally hauling wood from mountains, being driven 100 miles to the trip each day. The truck was photographed descending a steep grade about 50 miles from San Diego. A two-horse team could not do this work regularly in less than four days (25 miles a day) and the truck will haul twice as much to the load.

FAWSCO PRICE ADVANCE.

J. H. Faw, Inc., manufacturer and distributor of automobile accessories, 37 Warren street, New York City, has, because of the increased cost of labor and material, advanced the list price of the Fawscow improved combination oil cock wrench, gasoline gauge and cleaner from 35 to 45 cents rather than lessen its quality.

The General Motors Corporation has declared a quarterly dividend of three per cent. on its common and 1½ per cent. on its preferred stock, both payable Aug. 1 to stockholders of record of July 15.



One of the Federal Trucks Operated by the San Diego & Southeastern Railroad in California for Service Beyond Its Lines.

YMCA Appeals for Drivers and Mechanics

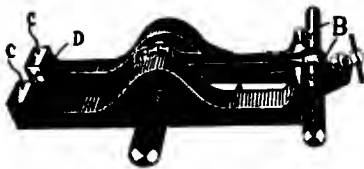
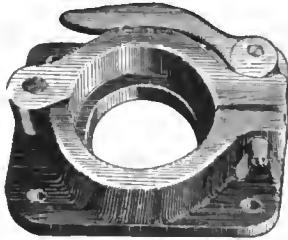
The National War Work Council of the Young Men's Christian Association is making an appeal for expert power vehicle drivers and mechanics to volunteer for service in war work in France. The need was never so urgent. The work of the association has increased greatly with the mobilization of American armies in France and Italy. There is every reason to believe that the demands will greatly exceed those that are now being met with much difficulty, and unless the association can continue its activities to the fullest extent the American forces will not have the support that is given them physically, morally and spiritually by the Y. M. C. A.

The workers of the Red Triangle serve for the common good of mankind, for the association does not recognize race, nationality or creed. The success of its activities depend very largely upon its power vehicles being maintained operative. The Overseas Motor Department, which maintains the machines, has made appeal for volunteers. It cannot augment its forces save by men volunteering their service.

There never was a time in the history of this country when the opportunity for volunteer service was so great for men over military age who can engage in Y. M. C. A. service. Garage owners and automobile dealers are urged to prepare themselves to not only give up, but seek the opportunity to offer the services of mechanical experts.

America has more than met every call that has been made upon her as a nation, and patriots whose ages deny them the privilege of joining the colors, who are qualified by driving or mechanical experience, can serve the cause just as effectually by doing Red Triangle war work behind the battle lines. Any Y. M. C. A. secretary will give full particulars at request.

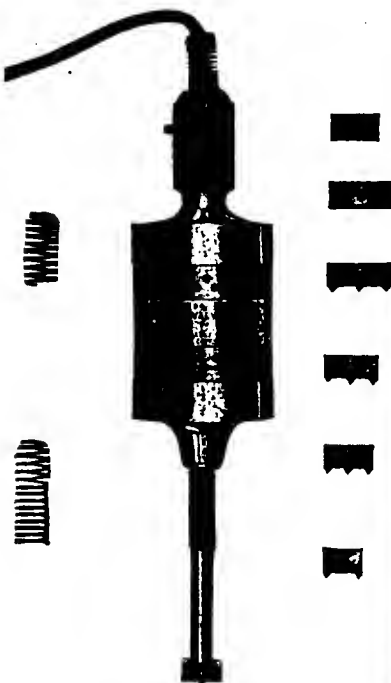
Garage and Service Station Machinery, Tools and Equipment



**Storm Connecting Rod Bearing Reamer,
Jog and Straightening Gauge.**

The Eclipse Valve Grinder is a practical and reliable electric driven machine, designed and built for the sole purpose of grinding valves to a perfect seat with the greatest possible dispatch and economy. The vertical handle with plunger switch affords perfect control, while the weight of the device (4½ pounds) is so proportioned as to secure the proper pressure for the best results; and the smooth gliding motion imparted by the ballistic movement produces a finish to both valves and seat that is free from grooves, scratches or other evidences of poor workmanship. With this machine few valves require as much as a four-minute treatment—many are finished in one minute.

Manufactured by the Eclipse Valve Grinder Co., 415 Bonfile Building, Kansas City, Mo.



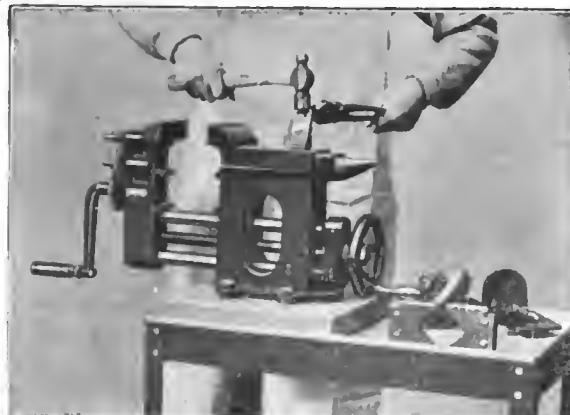
The Eclipse Valve Grinder.

The Storm Connecting Rod Bearing Reamer, Jog and Straightening Gauge is a new addition to the garage man's equipment. It is especially important and valuable because of the speed with which it does its work and because of the fact that it enables an inexperienced person to do connecting rod work just as accurately as though he had years of experience. The old method of fitting worn connecting rod bearings required considerable time because of the various operations of filing, trying, scraping and so forth; and then, even when done by experienced help could only be approximately accurate. But the results of this tool are mechanically accurate and the work is done in one-tenth the time taken by the old way. In fitting the bearings the faces of the bearing caps are filed away in the usual manner, care being taken to file away a little more than is necessary to take up the wear. The connecting rod is then placed in the jig, the reamer inserted and the bearing bolts drawn down tight; the reamer is next given one turn and it produces a perfectly round bearing, true and accurate. The tool also tests the rods for bend or twist. An engine should never be assembled without testing the rods in this way. The Ford connecting rod frequently becomes bent or twisted when held in the ordinary vise while tightening the wrist pin bolts and from other causes. To reassemble them in the engine without testing is to invite trouble. Only a moment's time is needed for testing and it is time well spent. The rod is tested for straightness over recess D and for twist and alignment over testing surface BB and CC.

Manufactured by the Storm Manufacturing Co., Thompson, Ia.

The Stewart Handy Worker is, primarily, a vise, but of special construction, so that many tools can be used with it. As a vise the jaws open to 4½ inches and being faced with steel, are practically indestructible. The jaw opening mechanism is operated by a hand wheel and screw, the sliding jaw being supported upon two heavy round pieces of cold rolled steel. The sliding jaw is fitted with a three-gear reduction spindle, with provision for handle upon each gear. The upper spindle extends through the jaw and is fitted with device for holding square shank drills, thus forming a drill press.

Manufactured by the Backus Novelty Co., 12th St. and Central Ave., Chicago, Ill. Price \$18.



Stewart Handy Worker in Use.



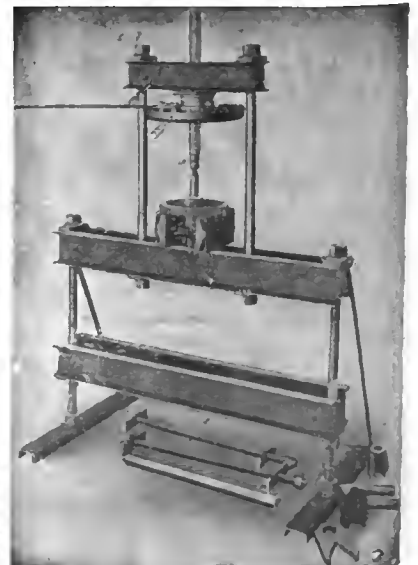
Portable Grease Cabinets and Pumps will handle oils and semi-fluid greases and also the heaviest transmission greases. The container is a painted heavy tin can of 20 pounds capacity, with handle and dust proof cover, provided with a nozzle hose. The valve castings have large grease openings, controlled by a single ball valve, assuring simplicity and strength. A baffle washer inside the container keeps the air from the pumps so that practically all the grease can be pumped out. The containers having ¾-inch openings can easily be filled.

Manufactured by the Midway Mechanical Co., 1555 Selby Ave., St. Paul, Minn.

The Manley 22-Ton Universal Auto Press has a high power leverage, starting at 2200-1 and automatically increasing at the end of stroke to 5000-1. This is obtained by the lever fitting into the socket on ratchet block. The press uses the same pressure in hand wheel and tremendous pressure is obtained on the screw with little effort. An important feature of this press is that the screw being exposed at the top may be struck a sharp blow in obstinate cases, such as a rusted shaft, which pressure alone will not move. With maximum pressure the jar of the blow does the rest. No damage to the press will result, as it is designed to withstand such a blow.

The low power press (1000-1) leverage is 10 times quicker than a ratchet.

Manufactured by the United Engine and Manufacturing Co. Price complete, \$88.



The Manley 22-Ton Universal Auto Press.



An "Ace" they call him —

because he has conquered his enemies again and again in battles of the sky.

Much of his success is due to quick turns—sudden nose-dives and dangerous tail-slides. All are accomplished because he has the nerve and knowledge to use the powers of his mount to advantage.

Yet that turn, slide or dive would have been disastrous unless the bearings in his

motor had proven - known - tested values.

The Hess-Bright Bearings are the logical choice for such service and you are safe to assume they will do duty equally as well—in motor or truck—where the punishment is not so grueling. You'll find them where motor or truck has built a reputation for long life of dependable service. They, too, are the "aces" in their field. For they have overcome all bearing problems.

THE HESS-BRIGHT MANUFACTURING COMPANY
Philadelphia, Pa.

Where Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

Mossberg Wrenches, in accordance with a constant desire on the part of the makers to manufacture the most adaptable line of all steel wrenches, are arranged in sets, and tools designed to meet the exact needs of the different lines of assembly and repair work are put out in a convenient form.

The assembling of sets to meet the various needs has required years of intensive study of assembly and repair work to insure a particular adaptability for each and every set. Mossberg designers have undertaken this and the enthusiasm shown for the various Mossberg sets acclaims the success of their work.

Such sets as the various small socket sets, Set No. 4 of open-end wrenches, the double-end sets have proven very popular sellers and are found to exactly meet the many needs of automobile and general repair work. The No. 4 set shown is particularly popular in the trade because of its wide range of sizes. The nine wrenches with their 18 openings fit all U. S. and S. A. E. sizes from $\frac{1}{4}$ inch to $\frac{3}{4}$ inch bolt or screw diameters.

General service set No. 1, set No. 3 for automobilists, and agricultural set No. 2 of open-end wrenches, all contain a range of sizes to fit the particular needs for which the set is arranged, and like Set No. 4 provides the most economical way of securing needed tools.

Mossberg Socket Sets, too, have been arranged in various sizes so that economical sets may be had that are particularly adapted to assembly needs.

Set No. 14 shown is the most complete set of sockets and tools for all repair needs.

Manufactured by the Frank Mossberg Co., Attleboro, Mass.

The Kimball Ball Bearing Heavy Type Jack eliminates dirty, hard jack work. Its long handle turns and raises or lowers the heaviest car with ease. Its rigid handle that is swung from the top, not the bottom, prevents it from falling over while being placed beneath the car and all the raising or lowering is done at the end of the long handle. The milled head of hardened steel on the top will hold anywhere, on any bolt, spring or clip. The ball bearings carry the lift and thrust, reducing the friction and making the jack work easily. There is nothing to get out of order and the entire jack folds up into a small bag.

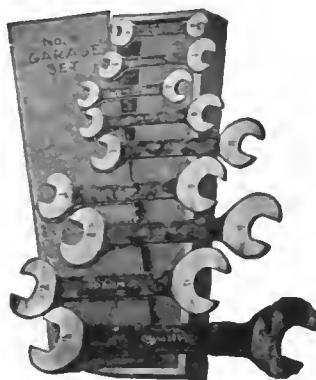
Distributed by Edward A. Cassidy Co., Inc., Madison Ave., at 40th St., New York City, N. Y.

The Yankee Vise, No. 1993, is designed for various uses. It consists of a cast iron body fitted with a sliding jaw, also of cast iron, which is carried back and forth by a $\frac{1}{2}$ -inch steel screw. Both jaws are fitted with steel faces and the sliding jaw extends through a slot one inch wide in the body of the vise. The device is mounted upon a swivel base and may be removed for use on a drill press, a shaper or with other machine tools. It may be used for various kinds of work on the automobile. The space between the jaws when fully open is $3\frac{1}{4}$ inches.

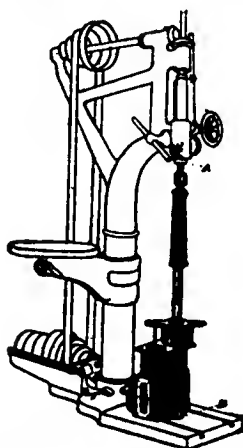
Manufactured by North Bros. Manufacturing Co., Philadelphia, Pa.



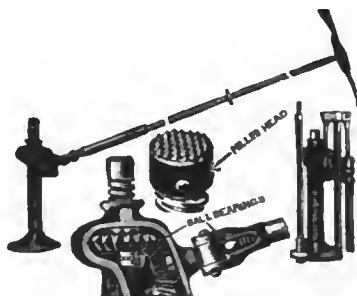
Yankee Vise.



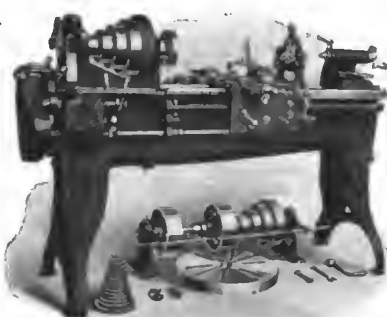
Mossberg No. 4 Garage Set.



Storm Standard Rebering Machine.



Kimball Jack



Barnes Extension Gap-Lathe.



Aloxite Cloth.

Carborundum Valve Grinding Compound is one of the standard products proved by time. This product is made to be safely used in any gasoline engine and the choice of three grades is given, coarse, medium or fine. It is put up in from one to five-pound cans and is growing more popular with discriminating manufacturers, engineers, garage dealers and repair men.

Manufactured by the Carborundum Co., Niagara Falls, N. Y. One pound can, \$1.25. Five-pound can, \$5.

The Storm Standard Rebering Machine is playing a very important part at the present time in the conserving and renewing of old engines of all kinds. The extreme simplicity and the ease of operation, together with the fact that the machine may be used either by hand or in connection with drill press or other power, making it admirably adapted for the use of the average garage. This machine is provided with six cutters, which are adjusted by means of a cutter adjuster bar and which may be set to cut to the different oversizes. The total adjustment of the Standard equipment is from $2\frac{1}{4}$ inches to five inches, with special equipment, larger and smaller made up to special order.

In addition to this machine the company manufactures a special Ford and Ford-Dodge machine, as well as other equipment for use in connection with the renewing of engines, including piston vice, valve tools, connecting rod reamer, jigs, gauges, etc.

Manufactured by the Storm Manufacturing Co., Thompson, Ia.

The Sliding Extension Gap-Lathe is capable of handling a wide range of work. It is provided with six quickly changed gear feeds and an extra large spindle. All the gears are covered with safety guards. The bed of the lathe is well braced and accurately proportioned throughout. The top sliding bed and main bed are planed full length and fitted together with dove-tail construction. A screw and crank at one end draws the bed back when it is desired to widen the gap between the centers.

Manufactured by the Barnes Drill Co., 814-30 Chestnut St., Rockford, Ill.

Aloxite Cloth, which is rapidly succeeding the old time emery cloth for general machine shop work, is put up in economy rolls as well as in reams, sheets and rolls. The cloth is cut in $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2 and $2\frac{1}{2}$ inch widths, snugly wound upon spools. The operator simply cuts off a piece in any length or width he desires. The rolls are 50 yards long and are made with any degree of grit. Aloxite Cloth is also furnished in 9x11 inch sheets.

Manufactured by the Carborundum Co., Niagara Falls, N. Y.

The Dyer Towing Device is a simple arrangement for fastening to the front axle of a Ford car and making possible the towing of the car by another without the aid of a second driver. The device is designed for attachment to the axle and is fitted with a clamp, which is fastened to the steering spindle connecting rod. The other end of the device is fastened to the towing car. When a corner is turned the rear car is automatically steered by the device.

Manufactured by the G. H. Dyer Co., Cambridge, Mass.



Dyer Towing Device.

ROSS GEARS

THE steering gear is the only part of a motor truck constantly in use in which human strength is concerned.

No matter how perfect mechanically the truck may be in every other respect, if the steering gear is hard to operate, neither driver nor truck can do justice to the work they have to do. On the other hand, a steering gear that is easy to operate conserves the driver's strength and increases the efficiency of both driver and truck.

The man who drives a Ross-steered truck knows by experience that the enormous bearing surfaces in Ross Steering Gears, together with Ross quality in

materials and workmanship, guarantee easy operation, as well as safety and reliability.

Ross Steering Gears mean an easier day's work for the driver, and at the same time a bigger return to his employer in greater service from both the man and the truck he drives.

As a result, Ross Steering Gears are now used as standard equipment by 115 different manufacturers, representing considerably over half the motor truck industry of the entire United States.

Write for catalog and any special information desired.

ROSS GEAR & TOOL CO.
790 Heath Street
Lafayette, Indiana



The Steering Gears that Predominate on Motor Trucks

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

The Bench Automatic Grip Puller can be used for removing either wheels, gears or flywheels and is so designed that when pressure is applied by turning the screw the jaws are pulled towards the common centre, thus making a positive, but automatic grip.

The body of the device is so designed that the jaws are removable, simply by the slipping out of the cotter pins and cross pins, thus permitting the insertion of larger or smaller jaws. Two sets of jaws are furnished; three 7½-inch jaws which open to 10 inches, and three 12-inch jaws, which open to 18 inches. Either a two or three-jaw combination may be used, as there is an extra jaw socket directly opposite one of the other jaws.

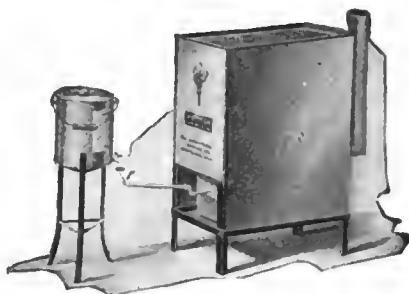
Manufactured by the Greb Co., 202 State St., Boston, Mass. Price \$20.



Bench Grip Puller.

The Scientific Garage Oil Heater burns either fuel oil or kerosene and embodies a new principle of oil burning. The burner itself is wickless and sootless, and no matter how strong the flow of fuel it will give perfect combustion. It is so constructed that all heat escapes from the top and none is radiated from the sides, thus making it practical for garages where there is little space between walls and car. It is built on the principle of the miner's safety lamp by which all air for combustion is taken through a fine gauze and through which flame cannot pass. Gasoline can be poured around the heater without danger of fire. The manufacturers claim a minimum use of fuel to heat the ordinary sized garage and eliminating danger of freezing, damage to body finish, etc.

Manufactured by the Scientific Heater Co., Cleveland, O.



Scientific Garage Oil Heater.

Union Tool Chests enable the mechanic to keep his tools for instant use in having them always at hand filed according to their adaptability to the job on hand. The cabinet is made in various types and the handle is covered with heavy, genuine leather and has heavy steel wire through the center. Loops secured by rivets carry the weight and cover the ends of the handle which is attached to the chest with heavy cotter pins, absolutely preventing its being pulled out of the loops. The frame is thoroughly seasoned, properly kiln dried selected stock, quartered white oak in quartered oak chests. Plain oak in G chests and basswood for covered chests. The drawer sides are of cherry or maple. The fronts of oak and mahogany. The bottoms of three-ply veneer. The hardware is extra heavy, with polished nickel finish. The lock of Sargent & Greenleaf with 100 key changes, of solid brass and bronze, with two milled slot, flat, rust proof keys.

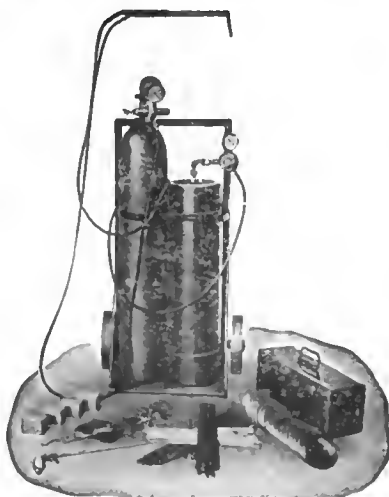
Manufactured by the Union Tool Chest Works, Rochester, N. Y.



Union Tool Chest.



Portable Floor Crane.



Dyer Welding and Carbon Outfit.

The Portable Floor Crane has many uses and the saving of time accomplished by its employment make it almost invaluable where much automobile or machine work is done. The crane illustrated is made of steel with a cast iron base. Standard cranes are made in a number of sizes and have capacities ranging from one to two tons with lifts from 6½ to 9½ feet according to size. The length of overhang is 30, 34 or 36 inches.

Manufactured by the United Engine and Manufacturing Co., Hanover, Pa.

The Dyer Welding and Carbon Removing Outfit has two utilities included, that of welding and cutting by the oxy-acetylene process and of removing carbon from the combustion chambers and cylinders of engines. With this apparatus the garage man and repair man can quickly and satisfactorily do all kinds of brazing, welding of broken parts, frame straightening and many other things requiring the use of a welding outfit. The material used in this outfit is of the highest grade. The regulators are strongly built and accurate. The Dyer Co. uses the United States Gauge Co.'s gauges, and the hose used is of extra heavy five-ply fabric. The outfit includes a truck made of the best grade of boiler plate strongly welded. The torches are simple in construction and easily handled, being of light design and highly efficient. The welding torches cannot back-fire under any circumstances and can be operated to a low enough acetylene pressure to practically empty the gas cylinders.

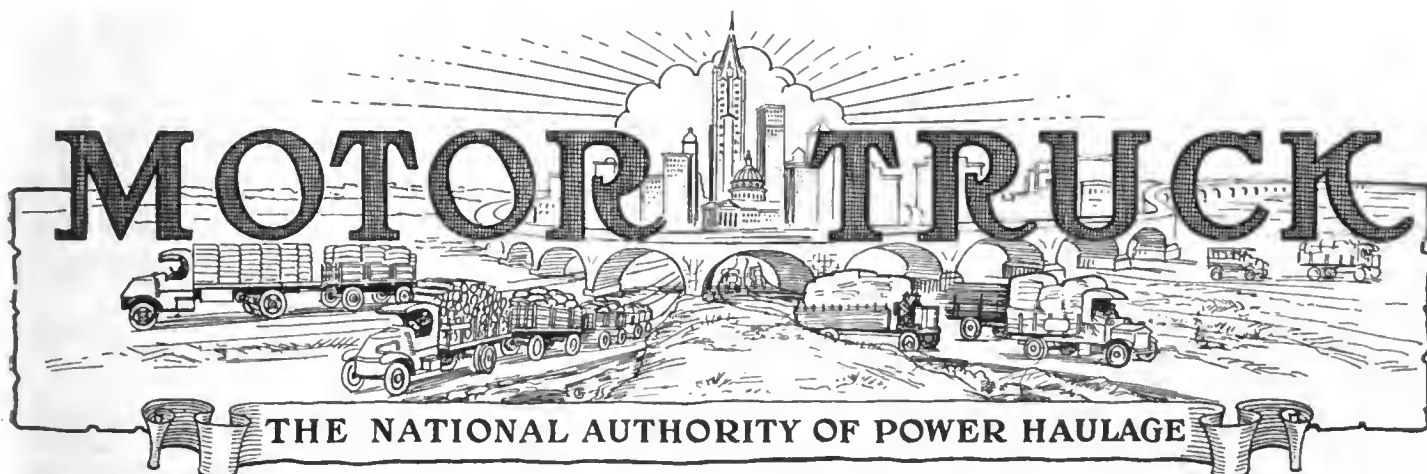
Manufactured by the G. H. Dyer Co., Cambridge, Mass.

The Weaver Tire Spreader is a device for inspecting the interior of casings, which operation is always necessary in repairing every puncture, blow out or other damage to either tube of casing. By means of a quick acting foot lever the casing is spread to its limit, thus exposing the interior for convenient and efficient inspection. It will be noted from the illustration that the convex plate which forms the table of the tire spreader is equipped with hooks, which after the casing is spread by means of the jaws, can be applied to the bead at each corner of the plate, thus holding the tire permanently spread and with a solid backing. The casing with the plate of the tire can then be lifted off of the spreader and carried to the buffing wheel and the break in the casing buffed to the best possible advantage. A nest of rollers, which are designed to protrude through the buffing plate, carry the weight of the tire when it is being revolved on the spreader for inspection. These rollers, however, are suspended on spring tension, which allows them to be pressed down flush with the face of the spreader plate as the force of the jaws is applied to the beads of the casing for spreading. The shipping weight is 60 pounds.

Manufactured by the Weaver Manufacturing Co., Springfield, Ill.



The Weaver Tire Spreader.



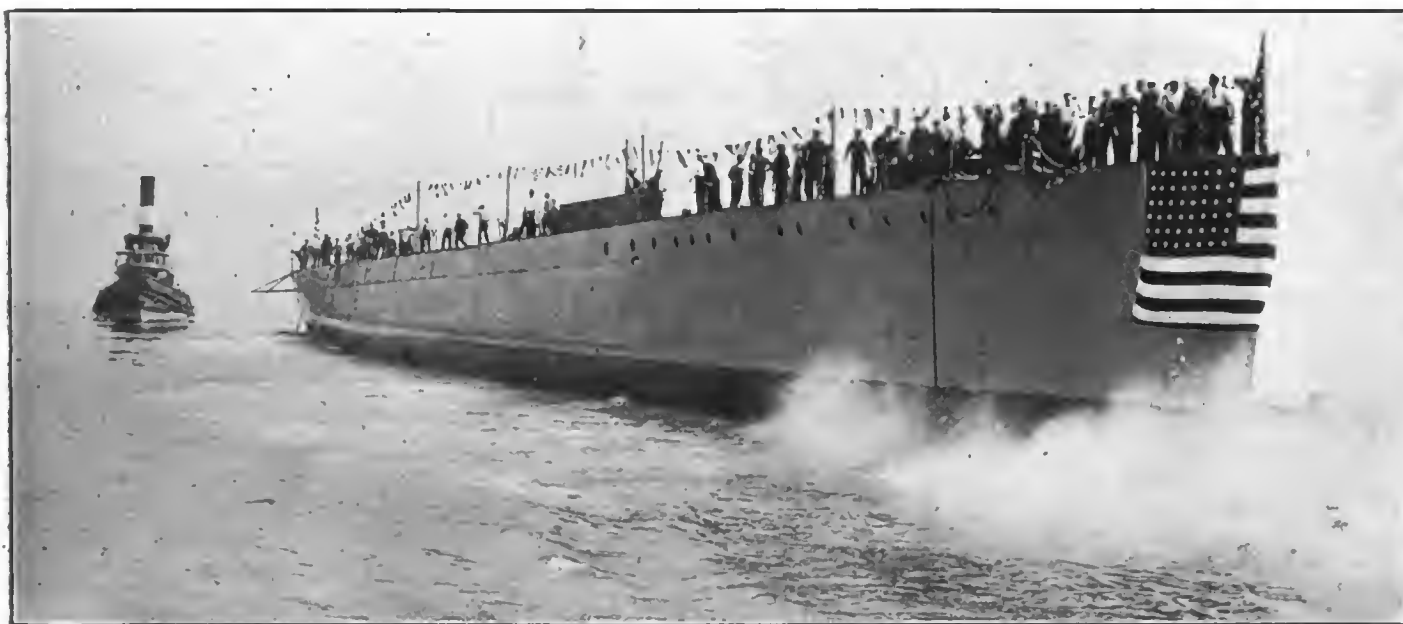
Vol. IX. No. 8.

PAWTUCKET, R. I.

AUGUST, 1918

DESTROYER PLANT WONDER WORK

Construction of Shipbuilding Yard at Squantum, Mass., Eight Times Faster Than Normal Industrial Speed, a World's Record, Due to the Use of Fleets of Trucks, Operated Almost Constantly



Destroyer "McDermot," Just Off the Ways at the "Victory Plant" of the Bethlehem Shipbuilding Corp., Squantum, Mass., Aug. 6, the Second to be Launched in 19 Days. (Copyright—International Film Service, Inc.)

AT THE launching on Aug. 6 of the United States torpedo boat destroyer "McDermot" at the new Squantum works of the Fore River plant of the Bethlehem Shipbuilding Corporation, Ltd., Mr. Charles M. Schwab, who made a special effort to be present, was asked to make a short address. After paying tribute to the men who actually built this boat—the second launched from this mammoth plant—he said in part: "I have just returned from a trip to the Pacific coast, where I saw some marvelous shipbuilding. The hard facts concerning the per-

formances of the ship yards in the East are that this plant, the plant at Fore River, and other plants in the Boston district, have set a mark unequaled by any ship yard in the United States."

Undoubtedly the "hard facts" Mr. Schwab had in mind included the fact that when it was decided to build these destroyers at Squantum there was no plant in which to build them.

On Oct. 7 of last year, when the first sod was turned, the site of the Squantum works was a salt marsh. It is located between Quincy and Boston on the harbor, some two miles from Atlantic

and about a mile and a half from a main trolley line. The ground was too low and marshy to be of any previous value and was separated from the main land on the Boston side by a salt river.

Some two months later a contract was signed between the Navy Department and the Bethlehem Shipbuilding Corporation for a series of destroyers, the first of which was to be launched in nine months' time. Taking into consideration the fact that the building operations had scarcely started and that previously two years had been required for the building of a destroyer, such a promise of de-

livery seemed almost impossible. But for all this and the approaching winter weather, the first boat was delivered on time—and in fact two months and 12 days ahead of time. The automobile truck was greatly responsible for the breaking of construction records. The speed of construction was eight times that attained in ordinary industrial work.

Some Details of Construction.

To give an idea of the vastness of the plant which had to be built and the correspondingly large amount of preliminary work needed to prepare the site for occupancy, a few of the constructional work statistics are given as follows:

One and one-quarter million cubic yards of fill were needed to prepare the site.

Fourteen thousand piles were driven, which if placed end to end, would extend for nearly 100 miles.

There are included in the plant two miles of macadam roads joining the different buildings, six miles of broad gauge and two miles of industrial railroad tracks and five miles of trolley track.

Two hundred and fifty thousand panes of glass are in the factory window sash. Altogether there are 12 acres of glass in the buildings.

The total roof area is 30 acres.

Thirty miles of piping were installed. Eight thousand gallons of paint were used.

Ten million feet of lumber were used. It would require a train of freight cars 40 miles long to haul this lumber.

Eleven thousand tons of structural steel went into the buildings.

Five thousand freight car loads of building material were delivered.

Then engineers and architects, Messrs. Monks and Johnson of Boston, who de-

SOME CONSTRUCTIONAL DETAILS OF THE "VICTORY" PLANT.

Filling of site required, cubic yards.....	1,250,000
Foundation piles driven.....	14,000
Macadam road built, miles	2
Railroad built, standard gauge, miles	6
Industrial railroad built, miles	2
Trolley railroad built, miles	5
Lights of glass in windows	250,000
Acreege of glass in windows	12
Total roof area, acres....	30
Piping installed, miles....	30
Gallons of paint used....	8,000
Lumber used, board measurement, feet	30,000,000
Structural steel used, tons	11,000
Building material delivered, car loads.....	5,000
Trucks operated by main contractors	90 to 100
Engineers and architects' organization, men	200
Contractors organization, men	5,600
Date work was begun..	Oct. 7, 1917
Date first launching..	July 18, 1918
Date second launching..	Aug. 6, 1918
Contract destroyer construction time, months.....	9
Actual destroyer construction time.....	6 months, 18 days

signed the plant and supervised its construction, had over 200 men in their organization, and the Abertbaw Construction Co. had 5600 men on its pay roll.

As can be readily judged when this

work was started the factor of prime importance was speed, with due regard for cost of the ultimate buildings. Accordingly the engineers and architects laid out the work to secure the desired results and perfected a smooth working organization among the different companies engaged in the work. The building contract was awarded to the Aherthaw Construction Co.

The first steps in the building operations after the lay out of the ways and buildings had been determined were to prepare the site. As noted above one and one-quarter million cubic yards of fill were required and here is where the motor truck started its prominent part. It was first necessary to start the fill from the Quincy side and to build a road over the marshes for about a half a mile. This roadway had to be raised and planked for at high tide parts of it were under water. Later a bridge was built to connect directly with the Boston roads and the electric car line to Boston.

Amount of Work Done by Trucks.

It was necessary to dredge the harbor in front of the ways and this was performed by suction dredges, which discharged on the marsh. In this way three-quarters of the fill was supplied, but Boston harbor is muddy and a dry fill was necessary. This dry fill totaled 320,000 cubic yards, and of this amount automobile trucks delivered 50,000 loads, or 200,000 cubic yards. In this connection four cubic yards were allowed to a truck due to the character of the material and the winter weather conditions. Besides the dry filling trucks were used to deliver crushed stone from Quincy and cement, lumber and other building materials from Boston.

There was a total of nearly 200 trucks and automobiles used in this work. The main transportation contract was let to



Site of Pipe Shop at "Victory Plant." This was a Marsh When Work Was Begun Oct. 7, 1917, and the Yard Was Constructed and the First Destroyer Launched July 18, 1918.

the Thayer-Griffith Co., which had its fleet of about 70 trucks in use. During the length of this contract, from October to January, they had an average of 50 trucks working 22 hours. Besides this equipment 20 to 25 trucks were hired. These trucks were of the metal body type, with hydraulic operated dump. Due to the nature of the ground and the material to be hauled, no trailers were used.

After the work got under way a broad gauge railroad track was built to the site for the delivery of the remaining dry fill and such material as came from a distance, or heavy structural steel, etc. The main roads about the site were macadamized to join the main roads to Quincy and Boston, which were of great advantage, still it was necessary for the trucks to deliver their loads of sand about the site.

It might be stated here that among the great advantages secured from trucks in point of time and efficiency are the unrestricted mobility and adaptability for dumping where the fill is needed. In contrast to dumping from railroad cars the advantage is great, for tracks do not have to be laid and changed continually, nor is so much labor required placing the fill. In these uncertain times it is not possible to secure a steady flow of building materials and for that reason men have to be switched from one operation to another, so when it was neces-



Practically All Sand for Filling Was Excavated with Steam Shovels and Hauled 2½ Miles by Five-ton Trucks—About 50,000 Loads.

sary to change the direction of the filling these changes were easily accomplished with the motor truck equipment.

Hauls and Methods of Loading.

The main sand haul was a round trip of 4½ miles and the rock haul was nine miles. The roads in the latter case were first class from the rock bins to the site and a round trip averaged one hour and five minutes. With the sand it was different, for there was a mean haul out of the sand pit and likewise around the site, so that the round trip was only five minutes shorter. The trucks were driven alongside a steam shovel and loaded directly. In the case of hauling supplies from Boston the platform type of body was used, except for cement and material, which would stand dumping. Besides the difficulties of hauling about marshy ground, New England experienced its severest winter of record.

When operations were at their peak

the temperature was at or below zero for days at a time, evidenced by 32 inches of ice in the harbor, and the thermometer went as low as 20 degrees below zero. But in spite of this cold weather, the trucks operated by night as well as day. Mr. Griffith of the Thayer - Griffith Co. said that he had never done work under such trying conditions and doubted if any one else in New England had had such an experience.

Before the work of motor transportation got under way it was evident to those in charge that its volume would be stupendous, and for that reason a special department was formed, under supervision of the engineers and architects, to handle this work alone. It consisted of six men who worked for the Aberthaw Construction Co. to keep records of material needed, such as sand, rock and building materials, and when it should be delivered. They also had men along the motor truck routes to check any delays due to breakdowns.

The Aberthaw Construction Co. would figure its requirements for transportation in advance, and advise the Thayer-Griffith Co. the day before how many trucks would be devoted to any certain particular work. This was made possible by previously determining the relative amount of work one truck could perform—such as how much tonnage from



Some of the Fleet of Five-ton Pierce-Arrow Trucks, About 70 of This Type Being Used, Owned by the Thayer-Griffith Co., Contractor for the Main Part of the Haulage Work at the "Victory Plant."

Boston or how many yards of fill per day.

The transportation company on its part organized a department on an efficient basis. A manager supervised the work and had one field foreman and a timekeeper, who also checked the loads delivered under him for each shift. The foremen were supplied with Ford cars. There were 110 to 115 men on the pay roll as an average. This system was found efficient in keeping the trucks moving to their minimum capacity. The truck drivers and helpers were carried to and from the job by automobile as few, if any, lived in this vicinity.

Provision for Repair Work.

A heated temporary garage to house six trucks was built at the job—a larger one was not necessary due to the continuous usage of the trucks. All minor repairs were made here, which included changing wheels. For major repairs the trucks were sent to the Boston Thayer-Griffith Co.'s garage, where sets of "spares" are kept, even to extra motors. Here a machine shop is available and trucks can be completely rebuilt. It was found necessary to keep three or four mechanics at the temporary garage, who besides making repairs looked after the general upkeep of the machines.

A record of each truck was kept showing the work done with it, the operating labor and repair costs chargeable to it. This card was made out daily. Such records show that there were only five to six trucks at any one time that could not be worked the full 22 hours daily. This means less than 10 per cent. of the entire fleet undergoing temporary repairs. This may seem a little high, but was not under the conditions causing many frozen hands and feet. The greatest difficulties were experienced on the night shifting during the cold weather.

The sand was frozen, the steam shovel operators could not work with precision due to cold weather and poor light, so that accidents did happen. Trouble was experienced by the pumps freezing while the machines were running, which stopped the circulation of the cooling systems. Another difficulty with the night shift was that the same class of men could not be secured as were on the day shift. To balance these difficulties the roads were clearer and quicker time could be made. However, even with the rivalry between the day and night men, the night records are not quite so gratifying. This was to be expected.

Value of Truck Mobility.

Messrs. Monks & Johnson express themselves as highly pleased with the results obtained by motor transportation as regards efficiency and saving in time and cost. They point out advantages secured by truck mobility and the delivery of material to the exact spot where it is needed. For an example, the foundations for a building may be completed before the site has been properly prepared—in fact the superstructure may be well along and trucks can then be used to make the necessary fills while dumping from railroad cars would be prohibitive. Instances such as this great-

ly expedite building construction. Two newer ship yards are now being built from plans by the above engineers and architects, one at Wilmington, N. C., and the other at Alameda, Cal. The latter will eclipse the Squantum yard in size and be the largest destroyer plant in the world. However, the Squantum plant will retain the distinction of being unique in that all the work of ship manufacture is roofed over and will be carried on under just such conditions as motor trucks are now built.

Besides this new work a large addition is being built to the Bethlehem plant at Sparrow's Point, Maryland, and the engineers are looking forward to the motor truck playing an important role in speeding up the construction of these different plants.

From the above presentation the reader can better appreciate the remarks of Mr. Schwab and the "hard facts" he referred to and understand the great value of motor truck equipment in dealing with the conditions obtaining in the building of the Squantum "Victory" plant.

CUTTING HAULAGE COST.

"Cutting the Cost of Hauling" is the title of a very interesting booklet published by the King Trailer Co., Ann Arbor, Mich., which after emphasizing the increased carrying capacity and reduced hauling cost with the use of tractors and trailers, shows examples of work in the lumbering industries, in wholesale and retail commercial work, and on farms, points out the value of special equipment, such as King pole trailers. The King-Irwin universal-motion, shock-absorbing fifth wheel and coupling are described, and specifications of King semi and pole trailers are briefly stated. The bulletin contains facts of interest to all engaged in heavy haulage.

MANSFIELD IN NEW FIELD.

F. A. Mansfield, for 12 years connected with Westinghouse Electric and Manufacturing Co., with the export and industrial departments, and recently engaged in government work, has resigned to become manager of the Pittsburgh office of the Mechanical Appliance Co. of Milwaukee, a new concern that manufactures motors and generators of limited sizes and has recently opened offices in Detroit, Chicago, Minneapolis, Cincinnati, Cleveland, Washington and Pittsburgh.

A brick factory building that will have floor area of 90,000 square feet is to be built by the Day-Elder Motors Corporation of Newark, N. J., at Irvington, that state, which, when operating about Oct. 1 will increase the production capacity from 10 to 20 trucks a day.

P. C. Chrysler is manager of a branch established at Philadelphia by the Hurlburt Motor Truck Co., New York City, under the name of the Hurlburt Motor Truck Co. of Philadelphia.

Record Army Truck Train March

The "march," which is the army definition of road movement, of a command from the plant of the Packard Motor Car Co. at Detroit to Camp Jessup, Georgia, a distance of 981 miles, the longest march in the history of the United States Army, was record making from a number of points of view.

The train consisted of 90 three-ton truck units, commanded by Capt. G. P. Hippee, with First Lieut. L. A. Couch and First Lieut. C. O. Middlebrook, and Capt. R. F. Andrews as special convoy officer. The train was manned by 200 enlisted men, selected from Mechanical Unit No. 305. The trucks were laden with freight and carried camp equipment, for the march was made in accordance with the regulations.

Because of the distance and the number of trucks the march was an unusual undertaking, but a considerable part of the way the roads were by no means comparable with those of the main routes between Detroit and the main shipping ports of the Atlantic coast. Not only were the roads poor or in part unimproved, but a very large number of bridges were constructed for much lighter traffic and the command had to strengthen and, in some instances, rebuild them before the train could proceed.

The most delay was at Guntersville, Ala., where the Tennessee river was swollen by rain and there was a one-man ferry with capacity of one truck a trip. As two hours were required for a round trip of the ferry, crossing would have taken nearly eight days of continuous operation of the boat. The train was moved down the river several miles, where there was a railroad ferry. The boat could carry 18 trucks at a trip, but to move the units on and off it safely approaches were built, which, with the crossing, required somewhat more than a day's time.

The train made the march in 17 days, which was an average of 57.8 miles a day, not accounting for stops, and the machines and crews came through without mishaps.

JOHNSON JOINS ANSTED.

H. S. Johnson, who was western district representative for the automobile equipment department of the Westinghouse Electric and Manufacturing Co. at Indianapolis, Ind., is now associated with the Ansted interests and is located at the plant of the Teeter-Hartley Motor Co., Hagerstown, Md.

The Dart Motor Truck Co., Waterloo, Ia., has been reorganized as the Dart Motor Truck and Tractor Corporation, with the personnel unchanged, and it will continue the manufacture of the present series of trucks, but will build a farm tractor as well.

MOTOR TRUCKS FOR RAILROAD RELIEF

Inter-City Express Service Frees Cars for Long Hauls

By J. C. Ayers, Vice President Denby Motor Truck Co.

THERE is no question of the seriousness of the railroad situation at present. With the enormous quantities of war materials and food-stuffs, all of which must be hauled to the Atlantic seaboard for transportation overseas, and with a maximum demand on factories in every line of business, the quantity of freight to be moved is unprecedented, yet the number of men with which to move it is considerably less than in normal times, and a great number of freight cars are tied up at eastern points awaiting unloading.

The only relief from this condition is motor truck shipments. Much of the detail work of the railroads is due to the small local shipments and a great many thousand freight cars are tied up in this work. All this can be eliminated by the general adoption of intercity trucking companies operating regular schedules between nearby cities, handling small lots of merchandise with motor trucks.

By taking this mass of detail work off the hands of the railroad organization

the terminals can be handled with fewer men and the goods that necessarily must be shipped by rail can be handled more expeditiously and with less labor. The thousands of freight cars which are tied up in this short haul work can be liberated for through shipments and for handling government materials.

Instead of cutting down the service that the merchants will receive, the motor express companies are actually giving much better service than the railroads can. The goods are handled but twice in place of six times in local rail shipments—they are loaded on the truck at the point of shipment and unloaded at the point of delivery, while by rail they must be loaded on a truck, unloaded at the terminal, loaded on the car, unloaded at the point of delivery, loaded from warehouse on to a truck and then from the truck at the consumer's store or factory.

An Inter-City Truck Service.

An excellent illustration of how this works out is furnished by the Intercity Truck Service, Inc., of Detroit. This company was started a short time ago by F. D. McCormick. He was a salesman for the Towar-Ayers Co., Detroit Denby man, and in the course of his work collected information concerning intercity express service. The possibilities of this service, both as regard better transportation and as a profitable investment, appealed to him so strongly that he re-

signed his position with the agency and organized a company for this work. He purchased for the initial equipment two Denby trucks of three tons capacity and will add other units as the business develops and the demands necessitate.

This company now has in operation a daily trucking service between Detroit and Flint and between Flint and Detroit—a truck leaving each city each morning and arriving at the other city in the evening. An office is maintained at both terminals and at intermediate points and both through freight and local is handled. Stops are made at 15 intermediate points, where deliveries and collections are made. Arrangements are made with other truck express companies so that they can handle freight also for points off their own run.

Speed a Feature of Service.

Pick ups are made at the various points around the city having material to go to Flint or intermediate points, and delivery made the same day. This is quicker service than could be obtained even by railroad express, and, of course, very much faster than freight service.

The value of this service has been quickly recognized by manufacturers and jobbers at the terminals, and by the merchants throughout the route and the success of the venture was assured immediately.

One excellent feature which was adopted by Mr. McCormick at the begin-



Inter-City Trucking Service, Inc.: Upper Left, Truck Enroute for Flint from Detroit; Upper Right, Type of Denby Truck Used, with Permanent Cover Support; Centre, Sign Carried by All Trucks; Lower Left, Picking Up Freight at a Warehouse Platform in Detroit; Lower Right, Taking on Load at a Detroit Factory.

ring is that of having a merchant in any city always deal with the same driver. This is accomplished by having an arranged meeting point half way between Detroit and Flint, where the Detroit man and the Flint driver exchange trucks, the former returning to Detroit with the load from Flint and the latter taking the Detroit load on to Flint for delivery. In this way the customer is always dealing both in delivery and pick up with the same driver.

Many thousands of these companies can be advantageously organized throughout the country, forming a profitable investment for the owners and performing a very valuable service in relieving the railroads and freeing many thousand cars daily for essential shipments.

TRUCK ECONOMY FOR LUMBER MILL HAULAGE.

Near King's Creek, N. C., Pursley & Falls are engaged in lumbering operations, and timber cut must be hauled 13 miles to a railroad station for shipment. Four two-horse teams were first used, but because these could not do the work other vehicles were necessary. Drivers for teams were difficult to obtain and rather than buy another team the company purchased a 3½-ton Federal truck, which is doing all the work that was previously done by five men and 10 horses.

The truck makes three round trips a day, a total of 78 miles, carrying as high as 2900 feet of dry sized pine, but the usual loads are from 1000 to 2000 feet of green lumber a trip. The roads are largely clay and there are 10 per cent. grades, but the fuel consumption is said to be a gallon to six miles.

Byrd Davis, a live stock dealer at Decatur, Ill., demonstrating the utility of power trucks to farmers and cattle raisers, moved five head of cattle from Lake Fork, 50 miles distant, in five hours.

The Maxwell Motor Co. has declared a dividend of 1½ per cent. on preferred stock, payable in October to the holders of first preferred dividend certificate holders of record of Sept. 10.

Truck Elasticity in Emergent Work

The elasticity of power truck service is not usually understood by owners, who believe that overloads are the only certain means of "getting something for nothing." The phrase is applied to uniform utility, without regard to the number of hours worked, for obviously machines can be driven constantly with changes of drivers. When necessity arises and the vehicles are used overtime not only is the return larger, because the normal working time takes care of all overhead charge, but the service afforded attracts and retains patronage that might otherwise be casual.

The value of service that is more or less emergent is very well demonstrated by the experience of Stacy G. Glauser & Sons, Chester, Pa., 14 miles from Philadelphia, which in a very short time has increased in population from 60,000 to 130,000, for some large shipbuilding and munition plants, and the Baldwin Locomotive Works, which employs thousands, are either in the city or nearby. The need of housing the workers caused the construction of hundreds of houses, and lumber, in which the firm deals, was demanded constantly and in large volume. With the railroads congested the only alternative was highway haulage from wherever lumber and materials could be obtained, often considerable distances.

The company operates with six five-ton White trucks and about 18 horses, the animals being worked only in Chester. Mr. Glauser's opinion is that the trucks do the work that would require from 30 to 40 horses normally, but occasionally they do much more. This applies to long hauls. One example was shipping an order of mill work to New York City by two trucks, a total distance of 224 miles, which was done in two working days. The trucks have been sent 125 miles to the eastern shore of Maryland to haul timber from forests, and the trucks constantly haul lumber from Philadelphia, making two round trips daily. Getting material by railroad is almost out of the question, because of

embargoes and other causes for delay. Last winter when road haulage was almost impossible because of snow, the trucks were rented to one of the government plants and used for heavy haulage around the works.

Another example of service was when an explosion destroyed a considerable part of an Essington explosive plant, trucks loaded with lumber for rebuilding reached the site before the flames were extinguished. The trucks are adjusted and repaired by a skilled mechanic, the drivers doing only minor or temporary work. The value of standardized equipment is that any driver can drive any or all of the trucks and the maintenance work is practically the same for all machines. The same care and attention serves equally well for all.

Had the company not had truck equipment it would not have been able to make deliveries or haul stock from distances, and were animal vehicles used the operations would have been of necessity limited to Chester and its immediate vicinity, and to ordinary working hours, which would have been very small as compared with the business now done.

NEW DUPLEX TRUCK DEALERS.

The following concerns have made agency contracts with the Duplex Truck Co., Lansing, Mich., according to statement by Andrew Langenbacher, its sales manager: Duplex Truck Sales Co., Denver, Col.; Sutcliffe-Reo Auto Co., Waterloo, Ia.; Don Sales Co., Rock Island, Ill.; Wichita Auto Co., Wichita, Kan.; Greenlaw Truck and Tractor Co., New Orleans, La.; Linscott Motor Co., Boston, Mass.; Nevada Sales Co., Reno, Nev.; Welfare Auto Co., Wilson, N. C.; A. H. Jones, Hastings, Neb.; West Side Motor Co., Hamilton, Ont.; Stapleton Motor Sales Co., Oklahoma City, Okla.; Northwest Auto Co., Portland, Ore.; Harriaburg Auto Co., Harrisburg, Pa.; B. L. P. Motor Co., Philadelphia, Pa.; West Penn Duplex Co., Pittsburgh, Pa.; Grady Motor Co., Salt Lake City, Utah; Myers Motor Co., Lynchburg, Va.; Duplex-Wisconsin Co., Milwaukee, Wis.; Frawley Motor Car Co., Dallas, Tex.; A. A. Tillman & Co., Hancock, Mich., and J. W. Wetzell, Akermanville, Pa.

DILLON IN NEW FIELD.

E. P. Dillon, manager of the railway and power divisions of the New York office of the Westinghouse Electric and Manufacturing Co. since 1917, has resigned that association to become general manager of the Research Corporation of New York City. He joined the Westinghouse company in 1909 after connection with different mining and electrical concerns in Colorado, and for several years prior to his transfer to New York was assistant to the manager of the railway and lighting department at the main office at East Pittsburgh.

The price of the Ford trucks is now \$550, a reduction from \$600, the original figure established. This is for chassis only.



Fleet of White Five-Ton Trucks in the Service of S. G. Glauser & Sons, Lumber Dealers, Chester, Pa.

ROLLER BEARINGS FOR MOTOR TRUCKS

By W. S. BENNETT, Sales Manager Bower Roller Bearing Co.

THE increased use of motor trucks has called for even greater care in the selection of bearings than in the past.

At the beginning of the general use of motor trucks to replace horse drawn vehicles a few years ago, practically all of the hauling was done between points in the same city. The extremely successful operation of these motor trucks made it apparent that they could be used economically for long hauls providing satisfactory roads were found.

About this time the use of automobiles for passenger use had made it apparent that good roads were extremely necessary, and while at first the roads immediately surrounding the larger cities were improved, the number and mileage of good roads increased to such an extent that it was not long before it was apparent that motor trucks could be used outside of corporate limits. Long distance hauling over known good roads was tried out and found eminently successful and this has been gradually developed to such an extent that now, due to the successful operation of trucks over considerable distances it has changed the traffic situation completely.

The United States government is using motor truck transportation in their postal service. For about a year one large rubber company has been running express from points in Ohio to New York and Boston.

High Grade Bearings Necessary.

These trucks used in long distance hauling must in order to maintain a satisfactory schedule comparable at all to express service, necessitate high speeds with consequent strains on the mechanism of the motor truck that demand very careful attention. Not only this feature, but probably brought about by just this condition, steel alloys have been found that will withstand continued shocks and the result is that smaller spindles and housings are used today than were possible a few years ago. This result principally has made the demand on bearing equipment for trucks a question that careful attention must be given to.

Now we come to the ideal bearing for motor trucks. In the past a bearing was satisfactory if it gave reasonable service for a period of one or two years, and economy and efficiency were lost sight of providing bearing equipment did not cause trouble in greater proportion than the other parts of the truck. But with the long distance hauling at high speeds comes the question of efficient satisfactory service, and as before stated, due to the lightening of shafts and housings, smaller spaces for bearings were demanded, and the ideal truck bearing must meet a number of stringent conditions. The bearing must be efficient, that is, friction losses in the bearing

must be kept to the minimum; it must give satisfactory service, that is, it must have a long life under high speed, heavy road shocks, etc.; and, third, it must have a large capacity in a small space.

Qualities of Bower Bearings.

The Bower roller bearing meets all of these conditions. The rolls being cylindrical in form roll between parallel races and there is a true rolling action with a minimum of frictional losses. The principle is demonstrated daily in the moving of heavy machinery by the use of rollers being placed under the skids. In fact, the development of the wheel for vehicles is an illustration of this part of the design of the bearing.

The fact that the rolls being cylindrical in form and operating between parallel raceways enables the placing of a maximum number of maximum diameter rolls between the raceways so that the speed of the rolls themselves is kept at a minimum and the road shocks are divided over a large surface. This explains also the meeting of the third condition, that of high capacity in a restricted space, because the large number of large size rolls assure that the pressure over any unit area of surface is kept at a minimum so that not only can a larger load be handled satisfactorily in a bearing of certain restricted dimensions, but unusual road shocks and speeds are satisfactorily taken care of.

Besides this, another feature makes the Bower roller bearing the logical bearing for truck work. Not only the fact that radial loads, or loads due to straight downward pressure are met by the cylindrical part of the roll, but also an entirely separate surface is provided for side thrust such as is produced in wheels by one wheel being lower than the other or by turning corners or other causes.

NAVY WANTS BOILERMAKERS.

The United States Navy is in great need of boilermakers, and appeal has been made by Lieut. Com. Newton Mansfield, Recruiting Inspector, Eastern Division, for enlistments for the duration of the war. The present pay for boilermakers is \$77.50 a month, in addition to which enlisted men are privileged to make special monthly allotments to dependents, which allotments are paid by the government, and they may also subscribe for insurance which is offered by the Navy Department at a very low rate. The age limits are 21 to 35 years. Application for enlistment may be made at any recruiting station of the Navy.

The All-American Truck Co., manufacturer of All-American super-trucks, has announced the price of the single size it builds, one-ton load rating, as \$1295.

AUTOMOTIVE MAGNETO IGNITION.

"Automotive Magneto Ignition," its principle and application, with special reference to aviation engines, is the title of a very comprehensive little book written by Mich. E. Toepel, a member of the Society of Automotive Engineers and an instructor in the United States government school for the study of magneto ignition, published by Spon & Chamberlain, 126 Liberty street, New York, N. Y.

It is written as a questionnaire and takes up the subject sequentially from the elementals of electricity, being practically a ready reference on the general subject of ignition as applied to automotive engines. While the text is necessarily condensed and the definitions concise, it is nevertheless a very desirable book for engineers and students. It is admirably illustrated with 50 cuts and diagrams and is indexed as well, so that any fact may be almost instantly referred to.

"MOVING THE FOOD FASTER."

"Moving the Food Faster" is the general subject dealt with from varying aspect in the August issue of the Federal Traffic News, the monthly publication of the Federal Motor Truck Co., Detroit. The uses made of power vehicles in hauling, distributing and delivering food products of all kinds, from farms, packing houses, wholesalers and retailers, and at different army cantonments, are presented interestingly, and besides these there is a timely article on rural motor express, and a statement of the results obtained through the service of a motorcycle mounted inspector employed by the Federal Truck Co. of St. Louis, Mo. Incidentally, some illuminating cost operating data, supplied by Louis Finn, a Long Island farmer, who owns a Federal truck, are given.

POWER TRUCK ECONOMY.

J. U. Addenbrook's Sons, Norfolk, Va., had contract to supply 60 tons of cement daily for road construction, to be delivered two miles distant. In 35 days a 3½-ton Federal truck made 407 round trips, totaling 1975 miles, and hauled 1524 tons of cement to different works. The total cost was estimated to be \$9.50 a day or 15 cents a ton for delivery, which is contrasted with haulage possible with one two-horse team, at \$5 a day, which could handle not exceeding 16 tons a day, which would be 31 cents a ton, or twice the computed expense with the truck.

By the erection of a building 140 by 400 feet and an addition to its power house at a cost of \$125,000, the Sarnow, Mich., Malleable Iron Co. will double its capacity.

IT'S EASIER TO PULL THAN TO CARRY

By L. E. McGLAUGHLIN, Sales Manager, the King Trailer Co.



Unloading a Lumber-Laden Semi-Trailer: Rolling the Load off the Jack-Supported Body by Turning a Crank.

WHEN one small town in rural New York state sees nine troop trains pass through within 40 hours, it is an effective manifestation of the railroad congestion. Not only troops, but immense quantities of material are being transported. The unusual demands upon the railroads put the transportation of ordinary industrial products in a feverish position. Increased freight rates generally, and sharp advances in short haul charges in particular are both indications of the abnormal rail condition and attempts to remedy it.

It is needless to say that both the war products and the rapidly increasing amounts of usual industrial merchandise must be moved. Transportation is the most essential factor of the times. Everything that must be shipped will be.

The whole country, however, is being forced to a realization of the efficiency of motor transportation, both for short and long hauls. "Be patriotic; use motor trucks," is not a truck sales promotion phrase. It is a truthful analysis of the situation.

If trucks increase hauling efficiency, help relieve the railroads and "deliver the goods" satisfactorily, much more does the proper use of trailers have this effect.

It is as fundamental as the force of gravity that "it is easier to pull than to carry." Evidence is to be had from sources farther back than the building of the Egyptian pyramids. The materials of which they are built were "trailed" rather than carried. The steam engine and its train, the tug boat and its barges are modern examples of the trailer principle. And now the motor truck has shown itself successful and decidedly efficient as a tractor.

Why Trailers Are Used.

The need for greater hauling capacity, the shortage of trucks, the lack of men, the desire to keep the original investment down, the importance of low maintenance expense and the character of the load or the road have brought the two-wheeled, semi and pole trailers into general use with trucks and tractors in

every line of business. Each type of trailer, two-wheel or four-wheel, has its definite uses, but the two-wheel trailer meets much the greater number of hauling conditions.

Scientific investigation and actual performance have proved that the average truck supplies drawbar pulls sufficient to haul about three times as much as it can carry. A truck rated at one ton carrying capacity will handle a semi or pole trailer with three times this load, or three tons. And this load in the trailer will be taken care of under practically all the conditions under which the truck alone could carry one ton. The average two-ton truck then with an appropriate trailer will handle a six-ton load under normal conditions or a three-ton truck a nine-ton load. The "part pull and part carry" method uses the power of the tractor truck in the most efficient way possible.

One of the strongest factors working against the use of horses for hauling today is the shortage of men for drivers and the high labor cost for those that can be obtained. This situation effects in slightly less degree the increased use of trucks. In this country at present there are approximately 435,000 trucks in use, averaging $2\frac{1}{2}$ tons capacity each. The addition of two-wheel trailers to all

of these units would provide an additional hauling capacity equivalent to 5000 trains of 55 cars each. And this increased transportation capacity is available without the addition of another man to the present list of motor truck drivers. The two-wheel pole and semi-trailers do not require an extra man to handle them under any circumstances. They are backed and turned very rapidly by the truck driver alone.

Trailers Are Easily Handled.

The turning radius of the six-wheel unit as a whole is no greater than that of the tractor-truck itself, and it can be handled generally in practically the same space. The backing is accomplished in exactly the same manner as with a horse and wagon. These features are immensely important when only cramped quarters are provided for operation. Conditions in many coal, lumber and freight yards, for example, prohibit the use of the long wheelbase truck, and here the semi or pole trailer is the only answer to transportation needs. Rough and winding roads of the lumber sections demand the use of the flexible two-wheel trailer equipment. When the length of a truck makes it impracticable for it to back to the curb for loading or unloading, the smaller tractor with its trailer can jackknife into position, and extend into the street only the length of the trailer.

Semi-Trailer and Supporting Standards.

A trailer rated at two or three times the capacity of the truck to be used as the tractor should be selected. But for us to advise fully as to the proper trailer and attachments for any truck it is but necessary to have the rated capacity of the truck, the width of the frame over the rear axle, the length of the frame behind the center line of the rear axle, and the height of the top of the frame from the ground, both free and under average load. It is occasionally advisable to cut off the rear of the truck frame in order to make it a satisfactory tractor for all road conditions.

Appropriate standards for each trailer are supplied when ordered. The King



Truck and Pole-Trailer Loaded with Structural Steel—An Outfit Adapted for Hauling Long, Heavy Materials.

fifth wheel makes it unnecessary to lift the front of the trailer but slightly. The short raise is effected and the standards set in position after lowering by backing the equipment a few inches. Standards are adjustable and should be set to barely touch the ground when the truck and trailer are empty.

Lumber Roll-Off Equipment.

To permit rapid unloading of material like lumber, semi-trailers may be fitted as shown in the first illustration, and as such are numbered SL-15, 2, 3 and 5. The load is placed upon two rolling bolsters and a roller. Revolving the roller at the rear by means of a crank rolls the load to such a position that the equipment may be driven out from under. A channel iron support at the rear of the trailer keeps excessive strain from the trailer suspension. After this support is lowered, driving the equipment forward a few inches sets it in position.

King Fifth Wheel Coupling.

The King fifth wheel should be bolted to the tractor-truck frame over its rear axle or directly in front of it. Four plates are furnished for the attachment. The fifth wheel frame is standard in 34-inch width. Other widths may be secured if ordered.

The success of truck and trailer equipment depends upon the fifth wheel connection. The exclusive shock absorbing, universal motion, stabilizing and quick coupling and uncoupling features of the King fifth wheel make its use essential whatever type of semi-trailer is operated.

The ball bracket and rub irons are attached permanently to the trailer. The rub irons contact with the circle on the fifth wheel frame whenever too great a side sway is imminent. The ball fits into a socket which is suspended between springs, thus providing both universal motion and shock absorption. The shocks and torque of starting and stopping and excessive movement on rough roads are controlled.

If trailers are to be operated in relays the quick coupling and uncoupling King fifth wheel is the only practical type to use. To uncouple, release the socket knuckle by pulling out the locking rod. The truck drives out from under, leaving the trailer supported by its standards. To couple the truck back so that the ball on the trailer strikes any point of the 12-inch mouth of the fifth wheel on the truck. Continuing to back, the ball slides into its socket, where it is held fast by the socket knuckle after operating the locking rod.

Pole Trailers for Long Material.

The King pole trailer is essential for hauling long material. It is fitted with an adjustable pipe reach providing for a length from six to 18 feet from the trailer bolster to the end of the reach.

For light loads, or when the trailer is to be used only occasionally, the front of the trailer reach may be hooked to the rear of the truck frame. A simple wooden bolster, No. SB-1, is placed on the truck platform over the axle of the truck and allowed to turn on its king pin, which passes through the floor. The load extends from this bolster to the trailer bolster, for which also a second

SB-1 should be especially ordered. It is evident that the trailer attached in this way and the load have different turning centers. The trailer reach, therefore, is allowed sufficient play, controlled by heavy springs, to take care of the variation in distance between the truck and trailer bolsters when the equipment is turned.

For continued use or for heavy loads the fifth wheel bolster, No. FDS-3, should be attached to the truck frame directly over the rear axle. The trailer reach in this case is fastened permanently to the fifth wheel bolster, by means of attachments. This insures the same turning centers for both trailer and load. The fifth wheel bolster provides shock absorption as well as free turning facilities. To uncouple the bolster part of the fifth wheel and ball bracket are removed entirely in the same way as indicated in the above description of the King fifth wheel.

Special Semi-Trailer Bodies.

Any type of body may be used on King semi-trailer chassis. The lattice stake is standard. If a different type is desired information may be secured from the



Discharging a Tractor and Semi-Trailer Load at a Freight Car, the Tractor Turned to Show the Small Space Needed.

King Trailer Co. The King semi-trailer may be fitted to the requirements of any business.

The trailer is logical in theory and has proved itself efficient in practise. The proper use of trailer equipment will cut hauling costs to a minimum and enable the owner to haul unusually large quantities of material within the shortest possible time. The King trailer and a truck together will put hauling on a scientific, profitable and patriotic basis.

GARMAN IS PLANT MANAGER.

H. B. Garman, for a number of years superintendent of the Detroit plant of the Steel Products Co. of Detroit and Cleveland, has been made manager of the Detroit works. This concern produces drag links, brake rods, truss rods, throttle rods, propeller tubes, tank straps, starting cranks, spring clip bolts and does a great deal of job welding.

The American Commercial Car Co.'s 1½-ton truck, which is known as the Wolverine model, will be sold for \$1825.

Road Builders Use Semi-Trailers

The utility of tractors and semi-trailer units are frequently demonstrated, but probably no more effectively than in the experience of the Highway Commission of Wayne County, Michigan, which has for several years been systematically improving the roads of that municipality, many of which are surfaced with concrete.

The base of operations in the county is Wayne, from which point materials and supplies are distributed to all places where work is contracted for. Where the distances were considerable transportation was by railroad freight until the exigencies of the war created such a shortage of cars that they were not always obtainable, and work that was imperative was frequently interrupted.

The commission then turned to the possibilities of highway haulage and acquired a four-ton tractor and a 10-ton Fruehauf semi-trailer unit, which was found to be extremely economical, not

only of labor and of time, but the haulage cost compared very favorably with what would be paid railroads for bulk freightage. Not only this, the commission could continue its work as planned and it was practically independent of all other forms of transportation.

Besides hauling materials and supplies the commission utilized the tractor outfit for moving industrial locomotives weighing 10 tons from place to place in the county, this being a very economical work as compared with teaming and railroad freightage. The spectacle of locomotives being moved in this manner was a very illuminating demonstration of the practicality of tractor and trailer equipment.

Additions which will increase the floor space of the factory and office 100 per cent. are planned by the C. A. Shaler Co., Waupun, Wis.

The plant of the United States Motor Truck Co., Covington, Ky., now occupies 32 acres of floor space.

SPECIALISTS LEAD TRUCK INDUSTRY

Well Designed and Service Proven Construction Units Are the Result of Years of Intensive Manufacturing

By F. E. Mosher, Secretary and General Manager the Covert Gear Co.



Section of the Gear Blanking Department of the Covert Gear Co.'s Lockport, N. Y., Plant.

THE motor truck is just being discovered. That is, its stupendous commercial possibilities are just being comprehended, even by the automotive industry. And it is safe to say that the general public has as yet no idea of what the truck will mean to it in the future, nor the magnitude to which the truck business will be developed within a few years.

It has always been thus. Either the coming invention is underestimated, or it is overestimated. The railroad, whose necessarily restricted field should have been at once apparent to every man, was spoken of in glowing terms not long after the first tracks were laid. Each farmer was promised a railroad running

through his farm and into his barn yard. The automobile was less fortunate. When it arrived the pendulum of popular opinion had ceased its swing toward the side of credulity, and was well on its journey toward the opposite extreme of doubt. The motor car was the victim and so was the motor truck.

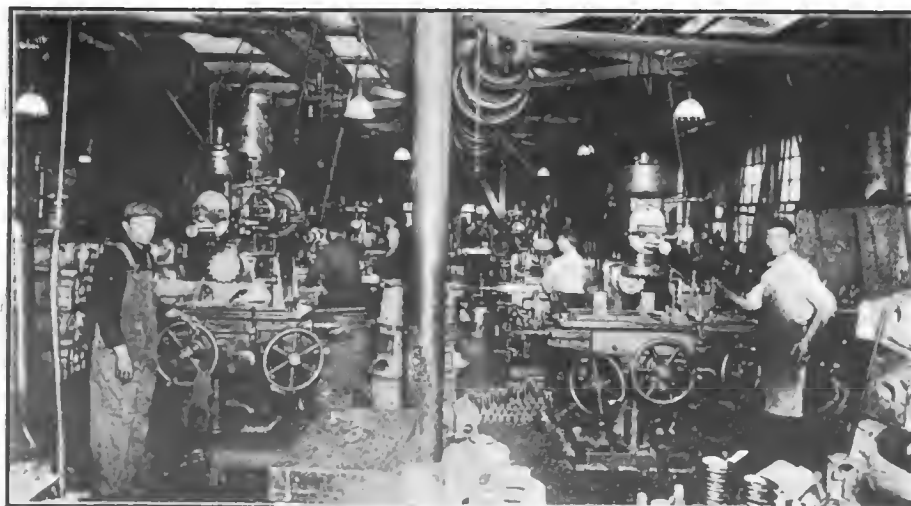
In fact the majority of persons today have absolutely no proper estimation of the possibilities of the motor truck—they don't realize that the truck, not the railroad, will constitute the line which will bring every isolated farm and village into close touch with the world, increase the radius of any one merchant's customer field two, three or four times, and enable the manufacturer to carry on his industrial activities with far greater facility.

Realized Truck Possibilities.

A few firms in close touch with the motor truck field realized the truck's possibilities some years ago. Among these few I believe that the Covert Gear Co. was one of the first. Because our company did realize the possibilities of the truck the Covert company today dominates in the truck transmission field.



Section of the Drill Press Department of the Covert Gear Co.'s Lockport, N. Y., Plant.



Section of the Milling Machine Department of the Covert Gear Co.'s Lockport, N. Y., Plant.

For years the engineering department of the Covert company has made a thorough and first hand study of the requirements of truck transmissions. It has been in intimate touch with the leading truck companies ever since the truck was a commercial possibility. And we must admit that the devotion of the Covert company to heavy vehicle power transmission was because that company foresaw the splendid future of the motor truck when even some motor truck manufacturers did not see it, and through its service in this direction won a prestige among motor car manufacturers that has made the name Covert on a transmission sufficient proof of its worth.

This branch of the industry will at least equal, if it does not outstrip, the

passenger car, is the faith of Covert officials. That faith was confirmed when in 1916 a number of prominent makers of pleasure cars went into the manufacture of trucks and in 1917 many others joined them. The demand for motor trucks up to the present has largely manifested itself from the cities; today it is beginning to come from the farms and the country—a demand that virtually will never reach a point of saturation.

Can Meet Any Demand.

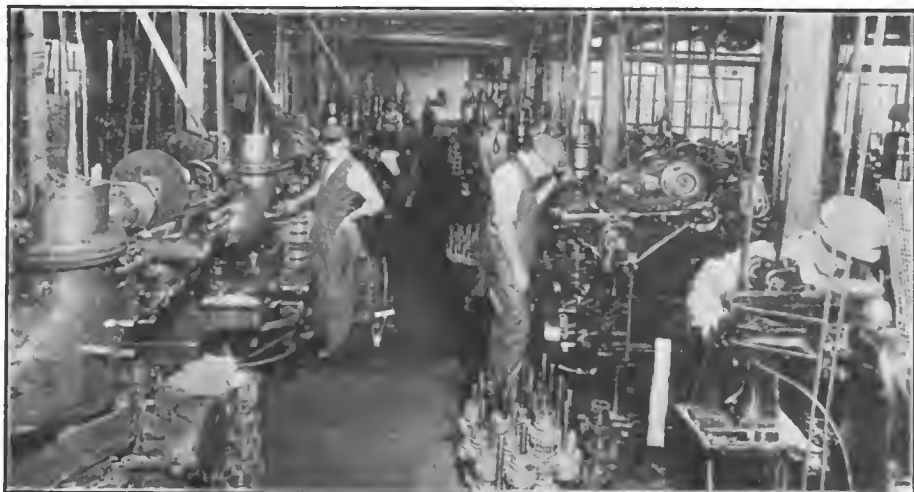
The Covert company has placed itself in a position where it can handle any amount of business, no matter how great and rapid increase. Its transmission facilities today are absolutely unexcelled. This, of course, is to be expected from almost any firm that has spent years specializing on one part of the motor truck and passenger car. Its engineering department, through long study of truck transmission requirements, is in a position to advise truck manufacturers on this important unit, and if found desirable to design a transmission to meet just this special problem.

The Covert plants in Lockport, N. Y.,

ert transmissions. In April, 1916, the name of the company was changed to its present title—Covert Gear Co., Inc.

When Philip A. Clum became connected with the company in 1909 the Covert company had reached a turning point in its history. The sales of Covert trans-

Grand street. At the same time additional property was acquired to provide for future expansion of the business, the company realizing that, at its rate of growth it would double and redouble its output capacity again and again. The vision of the Covert officials proved true.



Section of the Gear Cutting Department of the Covert Gear Co.'s Lockport, N. Y., Plant.



Section of the Gear Inspection Department of the Covert Gear Co.'s Lockport, N. Y., Plant.

are splendidly equipped to handle such business. The company has been thoroughly alive to the necessity of a highly efficient organization in every department, but especially in the important engineering and production departments. Men have been carefully selected for all positions of importance and the personnel of the organization ranks with that of any of the foremost organizations in the automotive field. In the automotive industry the names of P. A. Clum, president and treasurer; B. V. Covert, vice president, and A. A. Gloetzer, manager of engineering and sales, are factors to conjure with.

Company Founded in 1903.

The Covert Gear Co. was until 1909 the Covert Motor Vehicle Co. It was founded Oct. 27, 1903, to manufacture a small car. Early in 1907 the first transmissions were produced. They proved so successful that within a brief period the company was forced to discontinue motor car manufacture entirely in order to keep pace with the demand for Cov-

In 1910 the company was growing with such rapidity that it was compelled to double its capacity. A further addition was made to the plant in 1913-1916 by the construction of a three-story modern plant to be used for the manufacture of gears, one of the most important items of the product which had hitherto been provided for from outside sources.

The Covert plants in Lockport are in the very center of distribution and the shipping facilities are unexcelled. The proximity of several large manufacturing centers render the raw material supply obtainable without shipping delay.

The plant buildings are thoroughly modern in design and construction, equipped with the latest labor saving

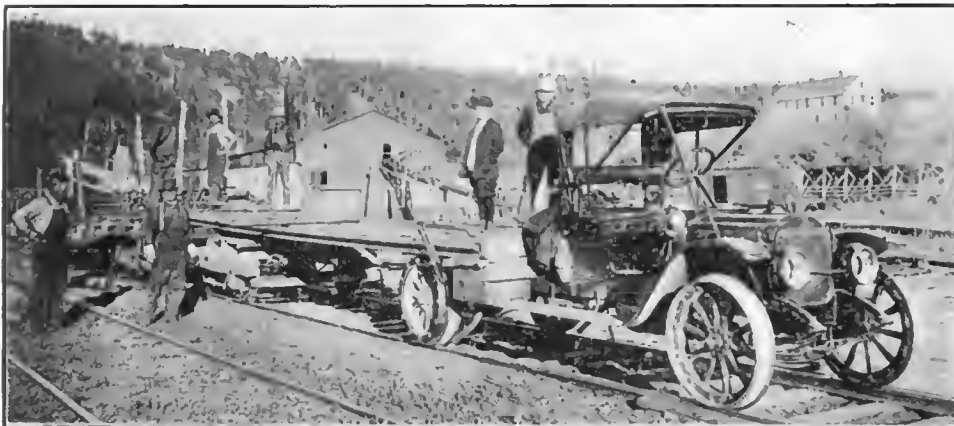


Section of the Assembling Department of the Covert Gear Co.'s Lockport, N. Y., Plant.

missions in that year were so large that the plant on Richmond avenue, in Lockport, was found entirely inadequate for the increase in production necessary, and a new two-story factory was built on

machinery, insuring efficient and economical production. The buildings are of brick, steel and concrete construction, thoroughly fireproof and sprinkled throughout.

Truck Chassis Adapted for Railroad Haulage



Truck Chassis Equipped with Flanged Wheels for Hauling Cars on a Western Railroad That Was Junked for the Metal in the Rails.

When the expense of operating is large compared with the earnings, which is true of many small railroads which have comparatively few trains, there is every reason to believe that practical service can be afforded with truck chassis as tractors. A five or $7\frac{1}{2}$ -ton chassis, weighted sufficiently to afford traction,

could haul several cars, and means of control could no doubt be applied to properly safeguard the tractor and cars.

A 35-mile railroad, known as the McLaughlin road, was built from Nahant, Mont., where it connected with the Burlington railroad, to carry on lumbering, but was abandoned by the owner. When

price of railroad equipment increased because of the demand for the steel the owner decided to remove the rails, which were serviceable, but found that the law prohibited the use of wood burning locomotives, coal was costly, and if heavy loads were to be carried the track would require considerable reconstruction to make it safe.

Contract was made with the Black Hills Transfer Co. to dismantle the track and this concern bought a White 3000-pound truck chassis and had it fitted with flanged wheels at a railroad shop at Havelock, Neb. This machine was used to draw a flat car, on which the rails were hauled to Nahant and delivered. The longest trips were made when the work was begun. During a month the machine was driven 3300 miles, an average of 127 miles a day for 26 days, hauling loads averaging 12 tons to Nahant.

All of the work when the car was light was done at top speed ratio, but with the car loaded grades as high as seven per cent. were made with the second and third speed ratios. The consumption of fuel was slightly less than a gallon for each 10 miles driven. Considering the roughness of the track the mileage and haulage results were surprising.

Special Truck Bodies for Unusual Work

Wherever practical to do so greater economies are obtainable by constructing special bodies adapted to the exact requirements of stated work. The cost of the initial investment will be increased, but the saving of labor and vehicle time will be such that in the service life of a machine it will much more than offset the difference in price. The ideas of the owner or driver may not be such that equipment can be constructed that will afford certain results, but generally an experienced body builder can adapt these so that they will be practical.

Quick discharging may gain but several minutes a trip, for instance, but when the work is continued day after day for a considerable period the aggregate will be surprisingly large. But in any event gain is only possible with special equipment, an interesting example being the body built for an electric truck owned by the sanitary department of the city of Asheville, N. C. The department collects and removes refuse of all kinds from residences and private and public buildings to an incineration plant, where much of it is disposed of by burning.

The plant has a large receiving bin below the level of the ground and over this is a wide door. The sill of the door is the upper edge of the bin. Loads could be dumped on the ground and then shoveled into the bin. To obviate this work and dump into the bin direct a steel body was constructed with straight sides and a floor almost semi-circular. On either side was a wide steel flange, the rear end of which followed the contour of the floor line to a point close to the top. A frame of steel angles was built

on the chassis, the upper side members of which was supported by body by the side flanges. On the left side of the chassis frame was installed a train of gears, operated by a hand crank, that turned a cross shaft on which were two arms, the ends of which were connected by long links in turn mounted on pivots on the sides of the body, forward of the center. Turning the cross shaft in one direction lifted the body to an angle of

55 degrees—in the other lowered it, the body rolling on the side flanges.

The truck could be backed to the door, the rear end of the body projected over the edge of the pit and the content deposited where but one more handling was needed. The shape of the body floor was such that any material could be discharged cleanly. Loading could not be quickly done, for the collections were made along routes, and the main economy possible is through careful attention to body design.



Electric Truck with Specially Designed Body in the Service of the Asheville, N. C. Sanitary Department.

Portable Equipment for Truck Loading



Portable Loader with Screening Attachment Used by Milwaukee Contractor for Sizing the Load of a Truck at a Gravel Pit.

Manual work cannot be performed with uniform speed throughout a working day if it is laborious. The strongest man will tire and the period neces-

sary to do a given work will lengthen. At the end of the day there is no reserve that can be drawn upon in the event of emergency. Labor has always been costly because of this fact, but today it commands wages approximately 100 per cent. more than ever before, and at that is not always obtainable.

Machine work has the value of being uniform, no matter how constant the operation. Machines are most productive when worked constantly, but if they

can be used but part time they are distinctly good investments, considering labor prices and the uncertainty of obtaining it. Where a machine can be

adapted to a condition so that a desired result will be obtained without increased cost or the purchase of new equipment, it has additional value.

A case in point is that of G. E. Fisher, Milwaukee, Wis., dealer in sand and gravel, who has pits where the material is excavated very inexpensively. His operations are not large and do not justify considerable investment. The gravel bank is a hillside that has been cut into at a level, so that the hauls from it to the highway can be made without ascending steep grades.

Trucks are used for haulage and these are loaded with a loading machine driven by a motor, energy being supplied by a cable from a convenient power circuit. The machine is portable and can be located wherever desired, and the trucks can be placed quite as conveniently. The loader is designed to load direct from the bank, but when a specific size of gravel is desired this can be obtained by passing the material over inclined screens of different sizes that are interchangeable, and can be changed almost instantly. The screened material falls into the truck and the remainder beside it. This can be utilized later and loaded by shifting the machine. Some trimming of the loads is necessary.

Elevating Side-Discharge Truck Body

Platform bodies for trucks are usually placed on bolsters on the chassis frame and the decks will range in height above the ground from 36 to 42 inches. Ordinarily shipping and receiving platforms are built so that they will be approximately at the height of standard truck and wagon bodies, and seemingly a few inches either way adds but little to the labor of loading or unloading.

But where loading or unloading must be done at platforms considerably above the decks of the trucks the labor must necessarily be greater and time of the truck lost. There are instances where the delivery of freight must be made at varying heights above the average truck platform, and where this is continuous good judgment would dictate the use of elevating bodies, an example of which is shown in an accompanying illustration. This particular truck is used by a Pittsburgh, Pa., ice dealer.

As will be noted, the body is steel, and it has a flat deck with large gates midway of the sides that can be lowered to any angle desired. These can be used as skids for unloading, if the platform is below or above the truck deck, or they can support chutes for gravity discharge.

The body of the truck is sheet and angle steel, with high sides, heavily capped. On the chassis frame is a frame of steel angles, stoutly braced by diagonals and the end pillars are anchored in substantial base plates. Between the end pillars are two heavy tubes that encase worm screws. On the lower ends of the screws are pinions that are turned by cross shafts. The upper ends of the screws turn in threaded blocks on the ends of

the body frame. Turning the cross shafts in one direction elevates the body and turning in the other lowers it.

The body can be elevated to the height of the frame, or it may be stopped at any point between, so that the platform is level with the deck or opening where

loading or unloading is desirable. The cross shafts are coupled so that they are driven by the power of the engine and the body can be raised or lowered quickly. In the accompanying illustration the body is shown at full height for purpose of loading a refrigerator car in a freight yard. Obviously this is but one of the many uses that can be made of this type of body.



Elevating Steel Platform Truck Body with Side Outlets for Discharging Loads at Varying Heights—Delivering Ice to Roof of Refrigerator Car.

Lee Dumping Bodies for Gravity Discharge



Truck Equipped with a Lee Two-Way Quick Discharging Body, Showing the Supports, Latches and Dumping Levers.

Lee two-way dumping bodies, built by the Lee Loader Co., are designed for installation longitudinally on a truck chassis, and will discharge the load by gravity at either side, the shape of the body being such that practically any material will slide quickly when it is in the extreme position. These bodies are built

of steel plate with straight ends and a rounded bottom, with sides that flare at one angle three-quarters of the height, and another slightly greater angle. The body frame includes three channels extending around it from top side to top side, the end channels being formed U-shape.

On the chassis frame are placed three cross members, slightly crowned in the centres, with the tips of the front and rear members curving upward to serve as stops. To the ends of the center member are pivoted the ends of latches that engage with catches in the center channel and when the body is centered support it rigidly at either side. On the ends of the body are two heavy metal brackets. Strongly braced inverted V-shape standards are at either end of the chassis frame, and at the apexes of these are latches, connected by linkage with levers mounted on the chassis frame. Pulling these levers releases the latches and when one side latch is released, by pulling downward on a lever on the rear end and close to the top, the body can be rolled to any desired position.

Heavy chains extending from the chassis frame to the bottom of the body prevent the body rolling beyond a point of safety on the cross members. By lifting upward on the hand lever the body can be righted and with the latches closed it is ready for loading. The discharge can be made wherever the truck can be driven beside a pit, platform or pile, but obviously it is not suited for chute delivery. At times two small body units, instead of one large one, are used for truck equipment, where two deliveries are to be made. These units are equally suited for semi-trailer or trailer equipment.

Industrial Tractor Trains for General Use

Industrial railroads are chiefly economical from the comparatively large loads that can be moved because of the relatively small power unit required. While the initial cost is considerable, if the equipment can be utilized frequently the expense is reduced in ratio to the work done. But the industrial railroad has limitations. The power and haulage units can only be used with track, and this can be laid in public ways but temporarily.

Internal combustion engined tractors are dependable, but skilled attention is necessary to maintain them. At the other hand the electric industrial tractor, which is extremely simplified, needs much less care. Aside from systematic lubrication there is no requirement save battery charging, and this can be done by practically automatic equipment.

The Lansing Co., Lansing, Mich.,

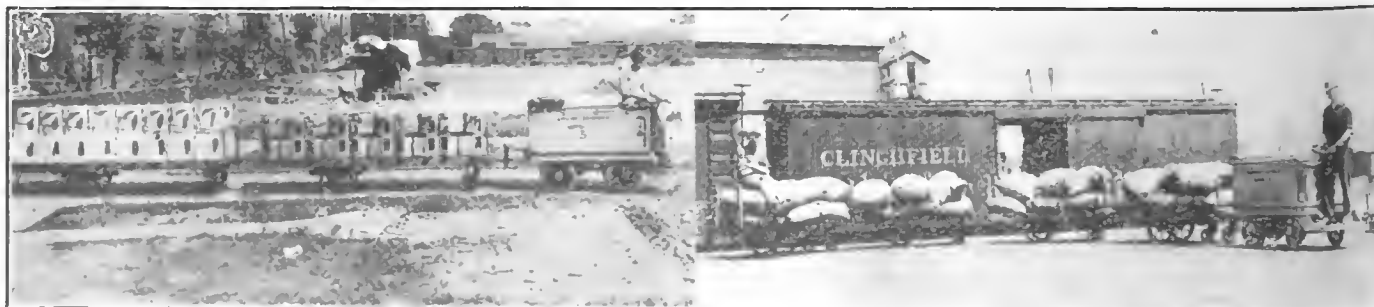
builds tractors that are small, but sufficiently powered to haul trains of from two to four trailers with moderately heavy loads, and more units could be drawn if the freights are increased in bulk, but not in weight. The tractors are four-wheeled, driven by motors installed under the decks, and the power batteries are carried in box compartments extending the full length of the chassis.

The driver's seat is on top of the battery box at the forward end, and there is a footboard on which the driver may stand. The control is a hand wheel that is equally convenient sitting or standing. The wheels are built for platform work, plank track or highways. The trailer units have steel frames and platforms of varying sizes that are mounted at the rear on dead axles. The forward wheels are smaller and are castor type, being

installed in pivoting yokes so that they are independent of each other, and follow perfectly the movement of the tractor without connecting linkage. Each unit has a draw head at the forward end and a draw bar at the rear end, by which they are coupled. There is a draw bar at the rear of the tractor frame. An accompanying illustration shows trains of these tractors and trailers in use at a factory, doing yard haulage, and about a railroad loading platform.

The Reo Truck News for July was largely given over to the presentation of facts concerning the uses made of Reo trucks by farmers, and also contained operating cost figures that are surprisingly low considering the services in which the trucks are worked.

The list price of the 3½-ton chassis built by the Maccar Truck Co., Scranton, Pa., has been advanced to \$4000.



Lansing Electric Industrial Tractors and Trailers: Small Units, That Will Turn Short, Adapted for Work in Buildings or Factory Yards, with Moderate Freight Capacity.

Building Wreckers Load Trucks with Chutes



Building Wrecker Economizes Time of Trucks by Using Chutes from Upper Floors to Obtain Gravity Loading.

Building wrecking is systematically done by concerns that purchase structures for the purpose of profiting from the sale of salvage, and the measure of profits in a considerable measure de-

pends upon the conditions of material that is removed. If it can be preserved undamaged, or so it can be restored to serviceability at reasonable expense, the care is justified. Good judgment would

dictate saving everything possible. There is much that is worthless, that is reduced to the form most easily removable.

Usually the debris is hauled away and disposed of at the nearest dump. As demolition is, in reverse of construction, begun at the highest parts, the material that is valueless can be dropped to the ground, but this would necessitate rehandling when loaded into vehicles, and another factor is the waiting time of the vehicles used for removal to the dump.

Professional building wreckers are as keen for economy as they are for bargains and while they cannot use special equipment that is specifically labor saving, they can so operate that labor and time of men and trucks is minimized. An instance of how trucks are advantageously used for haulage of wreckage is shown in the accompanying illustration, chutes being built from the upper floors projecting beyond the walls, so that whatever was intended for the dump could be accumulated near them. As the trucks were driven close to the building they could be loaded by gravity without loss of time. This method was utilized until the structure had been razed so that the chutes were no longer serviceable.

Quick Truck Discharge with Tipping Platform

Making the time of the truck productive practically every minute is what affords material economy, and such results cannot be obtained unless the owner will study conditions, determine the possibilities and secure equipment that can be adapted to every work. The thought given to a business problem is what really counts, and those who do not carefully weigh a proposition seldom realize anything like what might be possible.

In a city in the Middle West is a company operating as a grain miller that is peculiarly located. The city is divided by a river, crossed by several bridges, and on one side of this is the mill, one of the products of which is flour. On the other side of the river is a railroad, by which all grain shipments are received, and at the yard, so that the cars can be placed on a side track and unloaded, is the grain elevator.

The conditions required receiving the grain at the elevator, hauling it to the mill, taking the flour and other products to the freight station for shipment, and going to the freight station for more grain. The grain could be loaded at the elevator by gravity, and discharged by gravity at the mill, but a platform truck was necessary to haul the barrels and bags from the mill to the freight station. All the hauls were very short, for the round trip, including two loadings and two unloadings, was but 1800 feet. Speed was not so large a factor as continuous movement.

The company bought an electric truck with a large capacity high-sided body. The grain chute at the mill was at the

yard level. In the yard in front of the grain chute a platform was built that was balanced on a heavy shaft. The frame of the platform was steel, on which was a wooden deck. On the deck were placed four heavy clamps, one for each wheel, so that the truck could be driven on it and clamped immovable, one movement of a lever operating all clamps. The movement of another lever tilted the platform to a height so that

the load could be discharged into the grain chute. Reversal of the lever movements dropped the platform level and locked it. The truck could then be driven off. The machine was next loaded and sent to the freight house and unloaded, without raising the tail gate. There are those who might assume that a power hoist would have been equally economical, but discharge at the grain chute would not have been as positive, for the main object was to insure against loss of grain, which is practically possible with this equipment.



Tipping Platform Used at Western Grain Mill to Obtain Gravity Discharge of Loads Into Grain Chutes.

Industrial Truck Use in Munition Plants



Electric Industrial Truck Used in a Munition Factory with a Load of 220 Millimeter Shells for Delivery in Another Department.

War munitions may be said to include practically anything used for war fare, so that the phrase "munition plant" may have a very broad application, but the general acceptance is factories where arms and ammunition are produced. In

these plants numerous processes are required to complete a projectile, for instance, and the material passes from one department to another, where operations are continued to completion.

All operations require several hand-

lings, so that labor cost is high and the transfer from one operation or department to another necessitates careful attention to economy. Various equipment is used for moving the work, but the most satisfactory is electric industrial trucks, which have capacities of one to two tons, can climb or descend inclines, can be used either on floor forms or in the yards, and besides being noiseless, have none of the dangers that might eventuate from internal combustion engines.

The trucks can be operated by young men and comparatively little experience with them is necessary to qualify drivers. With interchangeable batteries the trucks can be used practically continuously, and the power cost is comparatively small. Fitted with various special bodies, which can be readily changed without holding the trucks for the handling of freights, and exchanging loaded for unloaded bodies, these trucks have been extremely economical. The accompanying illustration shows a truck used in a munition plant freighted with 220 millimeter shells, partly finished, and the weight of the projectiles may be judged from the fact that 11 fully load it. When finished the shells are 8.661 inches diameter.

Convertible All-Purpose Truck Body

The design of body that will serve a number of purposes, and be practically as well adapted for all of these is sought by practically every haulage contractor. The initial cost is not a barrier, for many willingly purchase two types of bodies, expecting to exchange them as work requires. There is no doubt that exchangeable bodies are desirable, but changes involve both time and labor, although with such facilities that they could be hoisted from and lowered on to a chassis, both of these items of expense could be minimized. Or fitted with rollers they could be taken from or placed on platforms.

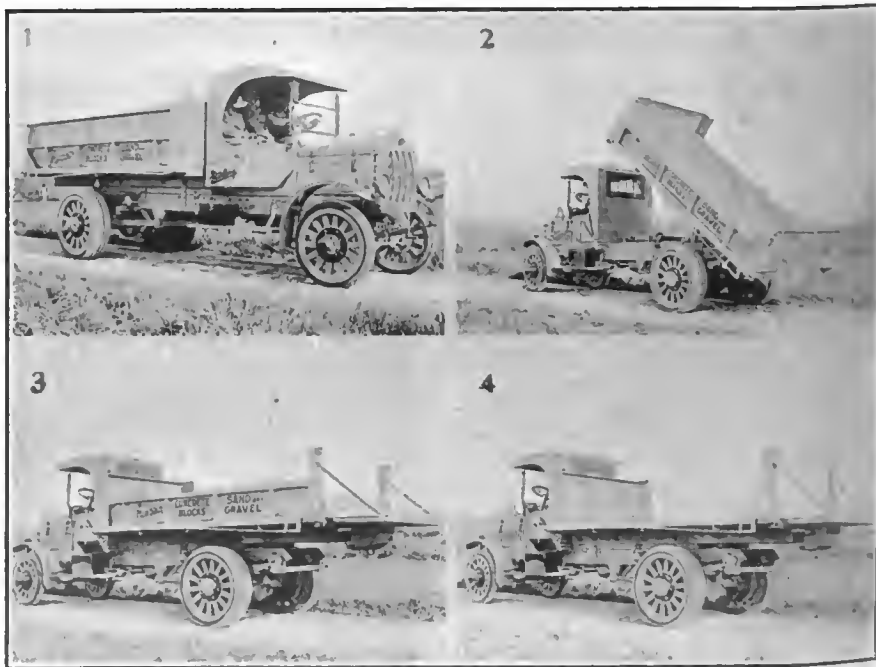
The demand for all-purpose bodies is generally for equipment of the largest chassis, because small units cannot be economically used for large loads. Many contractors believe that equipping their chassis with different types that are practical for average requirements is a fairly satisfactory solution of the question of truck bodies.

What is probably one of the most ingenious of body designs was built to meet the needs of Wm. Murdoch, West Allis, Wis., a dealer in building material—principally concrete block and sand and gravel. This is so constructed that it can be used as needed as a large capacity high-sided express body, a power hoisted rear-end discharging body, an extension platform express body and an extension platform truck, the two last being especially adapted for hauling material of unusual length, such as pipe, lumber or freights of exceptional width.

The accompanying group illustration shows the body and the different conver-

sions that are practical. The body is built of wood and steel, with a high steel front end and very heavy stanchions at the rear end, which are braced and reinforced to carry a double-acting tail gate that can be dropped from the top or released from the bottom. The sides are two-section, both of which can be removed, so there can be two heights of sides and a clear platform. The tail

gate can be dropped and carried by chains level with the body deck, or it can be unlatched from the driver's seat, so it will swing and not obstruct discharge. There is a gate outlet in the center of the tail gate, by which chute discharge can be made, or bags or baskets filled. The body can be elevated to have a floor angle of 45 degrees by a power hoist. The truck is said to meet every requirement of the owner equally well.



All-Purpose Convertible Truck Body: 1, High-Sided Express Type for Bulky Loads; 2, Upper Side Sections Removed for Rear-End Dumping; 3, With Lower Side Sections in Place and Tail Gate Lowered; 4, Sides Removed and Platform Clear for Long Freight.

Electric Industrial Truck for Contractors



Buda Electric Industrial Truck with Patented Body That Will Discharge a Load Clear of the Track or Platform.

Electric industrial trucks, both track and trackless types, are utilized for varying purposes, but generally in factory or inter-factory or shipping or railroad

terminals, where the hauls are short and freights are heavy or bulky. These trucks have varying load ratings, some of them to two tons. Being low they are

easily loaded and unloaded, and while usually equipped with platform bodies only, they can be fitted with crates, rack or containers of different kinds adapted for differing uses.

A truck chassis of this type was recently developed and is sold by the Buda Co., Railway Exchange building, Chicago, that is designed especially for contractors' work. The chassis itself is conventional, having load rating of two tons, driven by a motor and a power battery, and the body is a Lee slide discharging unit, having capacity of $1\frac{1}{2}$ cubic yards.

The feature of the body is that because of patented fittings the load can be discharged several feet clear of the truck, which is a decided advantage when filling is to be done or cement poured, as no further labor is required to practically finish the work. No other body will afford this result.

The truck is equipped with wheels suited for use on platforms, plank tracks or any highway, but the smoother the surface the less will be the draft of electric current. The capacity of the battery is sufficient to work a full day in average conditions, and obviously this could be increased by using two batteries and exchanging them. One man only is required to operate truck at any time.

Hydraulic Hoisting Quick Discharge Bodies

Power tipping or elevating bodies, to obtain gravity with which to discharge loads, are recognized as being especially economical by owners who haul loads that can be delivered without danger of breakage. Thousands of trucks are equipped with mechanism to lift the forward end so that the floor will have an incline of from 30 to 55 degrees, according to the material carried. Bodies so elevated are hinged on the rear ends of the chassis frame and the forward ends are lifted by the power of the engine, which is of necessity kept running.

The hydraulic hoist, so called, consists essentially of a trunk cylinder and trunk piston on the end of a rod projecting through the top of the cylinder, and on the end of the rod is a cross member carrying at either end a large pulley. A cable is carried from each of two arms extending through and below the frame of the chassis, up to, through and down from each pulley, the end being anchored on the chassis frame.

At the base of the cylinder is a small pump, driven by a take-off from the transmission gearset. The cylinder is filled with oil. There is a pipe connecting the upper and lower ends of the cylinder, through the pump. There is a bypass in the line that opens when the pressure reaches a specific point, and a release valve. When the pump draws the oil from above and pumps it into the cylinder under the piston, the piston is carried upward. At extreme height the bypass will open if the pump operation is continued, but the piston will remain in its position. Approximately 30 sec-

onds is required to fully elevate the hoist. To lower the hoist the release valve is opened and the oil is forced from under to above the piston by the weight of the body. Lowering requires about the same time as hoisting.

The advantage of the hydraulic hoist is that it will not freeze in cold weather, and being thoroughly lubricated there is but little wear. The hoist is positive and there is no possibility of fall of the body, and the power required for operating is very small. The accompanying illustration shows a large truck equipped for coal delivery with a rear end dis-

charge steel body, with a top-hinged tail gate fitted with an outlet for loading baskets or chute delivery. This type of truck, however, is not economical for delivery where it must be held for such work as is illustrated.

The Hawkeye Motor Truck Co., Sioux City, Ia., has advanced the prices of model K $1\frac{1}{2}$ -ton truck from \$1850 to \$1900 and the model L two-ton truck from \$2250 to \$2500.

A. W. Fisher is manager of a branch established at San Francisco, Cal., by the Hyatt Roller Bearing Co., Chicago, from which the trade of the Pacific coast will be served.



Truck Equipped with a Hydraulic Hoist and Rear-End Discharging Body, with Double-Acting Tailgate and Chute Outlet.

Galion Portable Loading and Unloading Bins



Galion Unloader, a Portable Outfit That with One Man Can Handle 500 Tons of Loose Material in 10 Hours.

Construction material is often transported by railroad and delivered in yards or on sidings in car loads. The freights must be unloaded and hauled to where the work is progressing. Unless the cars can be placed on trestles, or there are depressed drives beside the tracks, carts and trucks cannot be loaded by gravity. Shoveling is slow and

costly for labor and for loss of vehicle time. If the cars are high the shovellers must throw all material over the sides into the vehicles. Men will tire rapidly and the last hours of the day the work will be comparatively slow.

The Galion portable unloader is intended to do work on a large scale. It consists essentially of a frame, mounted on four heavy wheels, that supports a hopper bin with capacity of from 15 to 30 tons, the floor of which

is inclined at 45 degrees angle. At the bottom of the hopper are three gates with chutes that can be raised or lowered. The trucks or carts are driven at this side of the unloader and are loaded by discharge from one or all three chutes.

The unloader is located close to a railroad track. A pit is dug between the track and the unloader that is sheathed

with plank. From this pit an inclined bed for a steel chute is dug, the upper end of which rests between the rails. Removal of one tie affords an opening for the chute. The lower end of the chute closes with a gate. A track consisting of two pieces of timber extends from the bottom of the pit, near the track side, to above the top of the hopper. This track carries a steel bucket that is raised and lowered by a small gasoline engine that turns a drum on which is wound a steel cable carried through a block on a timber tower above the hopper.

The unloader is intended for use with all forms of bottom discharging cars, most of which will discharge by gravity on the track. As the material falls on the track above the chutes it is carried to the bucket in the pit and is hoisted to the top of the hopper, the bucket being tripped as it reaches the top. The unloader is operated by one man with a long lever, movement of which closes the gate of the chute into the pit and starts the hoisting engine. When the engine is stopped the bucket descends by gravity to the bottom of the track, being controlled by a brake. With bottom discharging cars but little trimming of the cargoes is needed, and the only essential is that the cars be moved along the siding to discharge over the chute in the track. The capacity of this equipment is stated to be from 450 to 500 tons a day of 10 hours.

Car Dumping Elevator for Stockyard Use

Sanitary requirements necessitate constant removal of manure from the Union Stock Yards at Chicago, and a number of trains are loaded each day with freights that are shipped to surrounding areas, consigned to farmers who use fertilizers in large volume. The expense for this work was very large and to obtain economies horses and carts were replaced by gasoline tractors that haul trains of small box cars. The tractors and cars are designed for use on the paths and platforms in the yards.

The cars are loaded in different sections, in buildings and pens, and are collected by the tractors and hauled in trains to railroad cars. Loading from the units of the tractor trains would necessitate the employment of a considerable number of men. In keeping with the policy of the yards minimized expense was sought, the belief being that the saving extended over a considerable period of time would justify any reasonable equipment cost.

An engineering firm surveyed the proposition and designed and built a mobile elevator, driven by an electric motor supplied with current by a long cable suspended from overhead wires. The elevator is mounted on a platform on four wheels and can be moved for a considerable distance along a platform on to which the yard tractor trains are driven.

The railroad cars are placed on a siding next to the track on which the ele-

vator is located. The tractor trains are drawn on the platform, and beginning at

one end of the freight cars the elevator picks up each trailer car in turn, carries it to the top and turns it so that the contents fall into a chute and through this into the railroad car. The trailer cars can be dumped precisely where wanted to load the railroad car, and comparatively little work is necessary, even though the loads are high. One man operates the elevator and with two men trimming, the railroad cars are loaded with surprising speed.

Though designed especially for the stock yard service, there appears to be no reason why the dumping elevator could not be utilized to similar advantage where the car

loading is continuous and on a large scale. This might apply wherever cars or vessels are unloaded where conveyors are not practical and portability is a prime necessity.



Special Electric Track Elevators Designed for Dumping Loads of Small Collecting Cars into Freight Cars at the Chicago Stock Yards.

Trucks as Tractors for Industrial Roads



F-W-D Truck Used to Haul Trains of Side-Dumping Cars on an Industrial Railroad Track by a Western Road Builder.

Industrial railroads have been used for years in construction work with cars moved manually, by animals or by small specially built tractors or locomotives, and these have been found extremely profitable from the fact that they could be transported from place to place. The value, of course, was proportionate

to the operations, but they could not be used continuously, and there was from this fact considerable shrinkage in the actual productiveness. Again the cars might be used in relatively small work, but the tractors, which were either steam, gasoline or electric, could not be used without rails.

Where the hauls are of any considerable length a decided saving is possible with power trucks instead of tractors, which can be driven astride of narrow gauge tracks, having much greater traction and consequent haulage capacity, and can draw from 15 to 30 cars in trains, according to the grades and the size of the cars. The only equipment necessary is fitting the truck with a draw head to which the cars can be coupled. When uncoupled the truck can be utilized for any work for which the body is adapted, so that it can be kept productive and no time need be lost.

The accompanying illustration shows the use made of an F-W-D truck by an Iowa road building contractor, who proved that he could haul material as far as four miles more economically than he could move his base of operations from time to time as the work progressed, and with trains of cars could keep pace with operations, no matter how rapidly these were carried on. In this instance side dumping cars were used, each having from 1½ to two cubic yards capacity, and the truck hauled these with comparatively small fuel and oil consumption. Compared with animal vehicles or individual trucks the railroad haulage was decidedly economical and satisfactory.

Chute Discharge Elevating Truck Bodies

Probably no better illustration can be cited of the care that must be given to the choice of body equipment for trucks than is afforded by the utilities of the quick discharge type, which will empty in 30 seconds after elevation to full height, and the slower discharging bodies that will require from five to 10 minutes to empty. The first mentioned bodies include those that are fitted with varying forms of power hoists to lift the forward ends, the discharge being at the tail gate, which is comparatively close to the ground; side discharge bodies that will drop the load beside the truck, and elevating bodies that can be discharged by chutes through the tail gate only. The other classification consists chiefly of those that are designed for discharging through side outlets from elevating bodies.

Wherever the end-discharging body truck can be backed to a pit or a platform and close to the point of dumping it meets every requirement. The side-discharge truck can be driven along side of a pit to dump, but the load must be handled again if the work or receptacle is a few feet away. The elevating rear-discharging body can be used with a chute, but it must have considerable space to position it. The truck equipped with the elevating body that can discharge from the side cannot be unloaded as quickly, but when one considers that all handling is obviated the saving is far more than appears. This is especially true in city coal delivery, where the work must be done in narrow alleys or in streets that cannot be obstructed dur-

ing business hours.

The truck shown in the accompanying illustration is equipped with a steel super-frame on the chassis frame, on which is mounted the hopper type body within a heavy frame, the outlets being slightly above the chassis. The body is elevated by four worm screws, two at either end, turning in threaded blocks in

the frame carrying it, and it can be raised to the height of the screws. The screws are turned by a longitudinal shaft, carrying gearing meshing with gears on the lower ends, that is driven by the engine. With chutes coal or similar material can be carried approximately 30 feet from the truck and discharged with such volume that there is a large saving of labor, although the time of the truck is not so well economized. These are adapted for narrow street delivery.



Elevating Steel Hopper Type Body with Side Outlets for Chute Discharge, Designed for Coal Delivery.

Electric Crane Tractors for Dock Service



Electric Tractor Equipped with a Crane, Used at a Navy Yard with Specially Designed Three-Wheeled Trailers.

Labor saving equipment developed for a special work can often be adapted for other purposes with varying changes, depending upon conditions and the needs for operating. A type of electric tractor that has seemingly large possibilities has been built for service in a United States navy yard. This has a rectangu-

lar frame of heavy structural steel, with large cross members, reinforced at the forward end to carry the base of a crane jib that is pivoted to swing approximately 240 degrees.

The frame is mounted on semi-elliptic springs and axles, the front axle being an automobile type with steering

knuckles and the rear axle a dead type with spindles for the wheels. A jack-shaft driven by an electric motor is carried on brackets about midway of the frame. The wheels are wood, shod with solid rubber tires. The power battery is in a compartment that with the driver's seat occupies the rear half of the chassis. The tractor is operated by a hand wheel in a vertical steering column and a controller.

Ahead of the driver is an electric winch that is operated from the seat. The winch is between the legs of the crane derrick, these legs being bolted to the sides of the frame. The crane has a cable hoist compounded to lift heavy weights, and a heavy load can be carried on this hoist and placed wherever desired within the height limits of the crane.

This tractor is used with one or more three-wheel trailer units, that have steel frames, the forward wheels being mounted in turntables, and the rear wheels on dead rear axles. The trailers are towed by V shape rods, the ends of which are secured to the ends of the axle of the front wheels, the apexes of the rods being coupled to the tractors.

These tractors and trailers can be used on piers, platforms, plankways or highways, and the tractors have ample power for any required service.

Drop-Side Power Hoisting Garbage Truck

Municipal service vehicles may in one sense be regarded as general purpose so far as work is concerned, for few departments of any city will have the same demand continuously. The needs will vary with the weather, and some executives believe the greatest economy is obtained by dual or even triple body equipment, so that the chassis may be kept at work by exchanging the bodies. There are times when emergency demands will necessitate working with vehicles that are not adapted to obtain the greatest efficiency, an instance of which might be snow removal, but these are the exception and do not justify expense for bodies that might be utilized, but a comparatively few days of the year.

Wherever possible economies are practical with bodies that will minimize labor, and an example of this may be found in Philadelphia, where street cleaning is done by a municipal department and by contractors. Street cleaning includes the removal of ashes, and this work is usually done by large capacity power trucks and crews of from four to five men. A body that was designed for collecting ashes and garbage is shown in an accompanying illustration installed on a 5½-ton Mack chassis.

As ashes weigh about 50 pounds to the cubic foot to carry a full load the body was necessarily much wider than what would be used for other work, and this was placed on bolsters on the frame to have wheel clearance. The upper halves of the sides were hinged to drop so that

there would be minimum height for lifting the ash containers until the body was half filled, which also lessened the dust caused by fall of the ashes into the body.

When half loaded the sides are raised and locked by pins through two heavy angle steel frames that cross the body at the height of the sides, and at the ends. The body has end frames, that at the rear carrying the tail gate. The chassis is equipped with a power hoist with which the loads may be discharged by gravity at the dumps. These bodies

have been found to be extremely serviceable and are regarded as economical of labor and time, two vitally important factors, while the construction expense is small.

NEW KOEHLER AGENCIES.

The H. J. Koehler Motors Corporation, Newark, N. J., has made agency contracts with the following concerns: John E. Watson, Woodstown, N. J.; Sauter Hardware Co., Shamokin, Pa.; J. Calvin Boyer & Sons, Pleasant Mills, Pa.; High & Trout, Pottstown, Pa.; Hawkins-Russell Motor Co., Atlanta, Ga., and Maykel Auto Co., Worcester, Mass.



End-Discharging Truck Body with Lowering Side Sections, Built for the Philadelphia Street Cleaning Department.

Economy of Gravity Loading from Storage Bins



Type of Bin Erected by Crushed Stone Company to Obtain Economy of Vehicles Through Gravity Loading.

The economies obtaining from gravity loading are so numerous and so well known that for years those who gave the subject of haulage cost even casual attention, and had the resources, constructed facilities that afforded them. Those who deal in material that has comparatively little value, and must be handled in considerable tonnage to be profitable, must give thought to detail and make initial investment necessary to minimize the work and time of vehi-

cles. The saving, however, is only in loading, because rarely can delivery be made where there can be similar economy.

Crushed stone is used in large volume for building and highway construction and the demand is constantly increasing, for it is often one of the materials in cement structures. The price is fixed by competition and is so small that in large measure upon the method of handling depends the profit, and, of course, there

are limits to the operating radius in which delivery can be made.

Stone when crushed differs in size and if the equipment is well designed the rock is carried from the crusher to pockets and sized by screening, each bin of the pocket containing a different grade. As the stone is sold by size grading is necessary. Storage in the bins is practicable for only a limited volume, but as a rule a pocket is expected to have at least capacity equal to that of the crusher for one day.

The accompanying illustration shows a typical storage pocket of a crushed stone contractor, which is elevated so that the vehicles may be driven beneath the bins and loaded. When power trucks are used for haulage the saving is very evident. Only at the beginning of work, in the morning and after lunch, is there any reason why there should be delay, even with almost continuous demand upon one bin. By starting the men in a definite order with reference to loading, that is, instead of having the drivers begin work at the same time have them commence in rotation at sufficient intervals apart so that the trucks may be loaded and driven away without waiting, there need be no congestion, no loss of vehicle time or labor. The only essential is an understanding with the drivers that they are to work a stated period—not from an arbitrary time, but a definite number of hours, no matter when they begin.

Quick Loading Equipment on Rented Piers

Docks and piers in New York City rent for prices that are prohibitive unless operations can be cooperative, or the concerns are so large they can use them exclusively. Hundreds of companies, some of them comparatively large operators, share in privileges where vessels can be docked and unloaded. Each must operate so that its own work can be carried on interruptedly, and generally speaking the limitations are the hours of daylight.

For instance, the Ames Transfer Co., a contractor of the Bronx, receives barges of sand at a pier on the Harlem river, and delivers the cargoes to building contractors in the northern section of the city. The movement of the barges are dependent upon towage, tides, loading and other conditions, and on arrival they must be unloaded quickly to insure against demurrage charges. The work of the contractors also requires that delivery be made continuously.

The privilege obtainable at the pier is short term, which precludes building storage bins of considerable capacity. Besides this the sand is only delivered a part of the year. Because of this reason the only practical economy, unless location was obtained so remote that long haulage would be necessary, is to unload from the barges into trucks on the wharf and pile what cannot be immediately hauled.

This company uses a steam track crane that can be moved along the pier as the cargo is taken from a barge, which is more advantageous than using a stationary derrick. As the trucks are available they are loaded direct, and the crane and a clam shell bucket can handle a large tonnage a day. If trucks

are not in readiness the sand is piled, and after the barge has been released the crane loads the trucks from the pile. While a part of the cargo may be handled twice, the most is made of the time of the trucks and the barge, and the only excess labor is the use of the crane. This, however, could only be economized by large initial investment for storage pockets, provided the company had a lease of the pier.



Steam Track Crane Used by New York Contractor to Unload Sand Barges and Load Trucks on Pier Where Storage Bin a Cannot Be Erected.

Combination Dumping and Platform Body



Combination Body That Can Be Converted to Stake Platform or Rear-End Discharging Types, Used by a Western Concern.

Building material dealers have quite as much need of platform or express bodied trucks as any other type, largely from the reason that with the single exception of cheap grades of brick practically all loading and unloading must be done by hand. Loads cannot be discharged in bulk because of the breakage that would result, this applying to brick, tile, cement blocks, roofing paper and other materials that might be damaged by their own weight if dropped from a body

to the ground. The character of the loads necessitates trucks being idle while loading or unloading, the only probability for economy in this respect being the use of demountable bodies, or, perhaps, trailer units that can be loaded without regard to the whereabouts of the truck or tractor.

A type of body that has in combination the qualities of three different type, platform, express and rear-end gravity discharge was built for the Whitnall

Coal and Supply Co., Milwaukee, Wis., dealer in coal and builders' materials, and installed on a Service five-ton chassis. The body consists of a short, wide platform, the purpose being to obtain capacity and the fullest advantage of body hoisting by having the rear end as high above the ground as possible.

The body has a heavy floor frame with a front end of steel plate riveted to a stout frame of steel angles. The tail gate is a double-acting type that may swing from the top or drop from the bottom, being mounted on steel posts braced with steel gusset plates. On either side of the deck, midway of the platform, is a stanchion similarly braced. The sides are two-section, one section fitting between the front and center stanchion, and the other between the stanchion and the rear side post, these being retained by close fitting yokes.

The side sections are steel plate riveted to stout frames. These can be removed at will, practically without labor. The body can be used with or without the side sections, and when loads are bulky the side sections may be taken out and a series of stakes placed in sockets along the side of the platform, these stakes being fitted for use with chains. The body is elevated by a hydraulic hoist operated by the power of the engine. The tail gate is fitted with an outfit for chute discharge.

Truck Loading Facilities for Large Works

Where excavating or filling work is of proportions that justify the steam shovel is utilized by contractors, but as the capacity of these machines is large provision must be made to remove the excavated material. If disposal is some distance from the work the number of vehicles will necessarily be considerable. The actual digging will depend upon the nature of the earth, progress being dependent upon conditions. If the earth is free from rock work can be done rapidly.

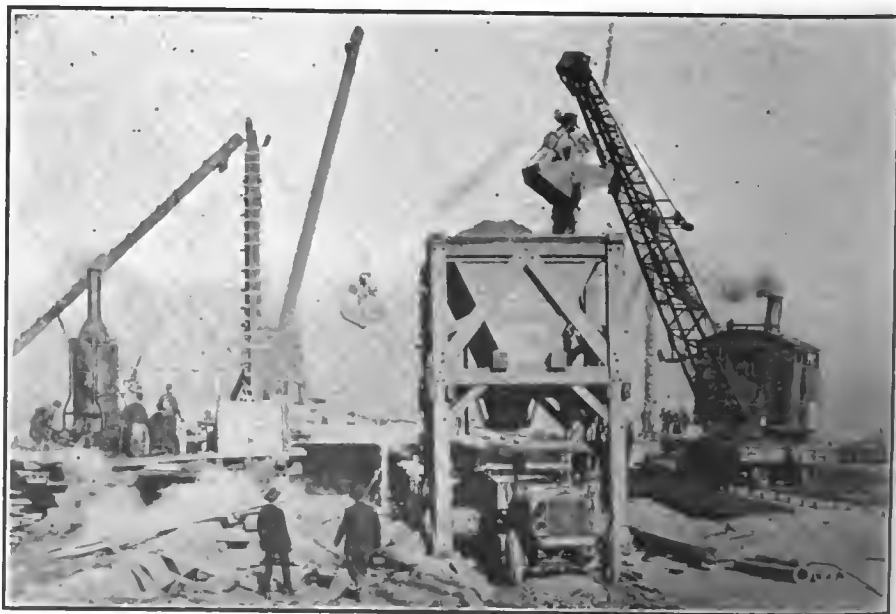
The main object is to minimize labor and time of vehicles. The shovel must be operated constantly, and with bucket capacity of from three-quarters to $1\frac{1}{2}$ yards a truck load of from four to five yards can be very quickly taken out. Loose earth will weigh from 75 to 80 pounds to the cubic foot and a four-yard load from 8100 to 8700 pounds; gravel weighing 95 pounds to the cubic foot would weigh about 10,250 pounds to the four-yard load; crushed stone weighing 100 pounds to the cubic foot would weigh about 10,800 pounds to the four-yard load; five-yard loads of the same materials would weigh approximately 10,800, 12,825 and 13,500 pounds. From four to five yards by weight would be loads for from five to six-ton trucks, according to the body equipment.

Where the material can be lifted from

an excavation and placed directly in trucks or cars comparatively little time would be lost if the work was systematized, but wherever practical the better practise is to erect a portable loading bin, with a hopper that will hold from 20 to 30 yards, and a gravity discharge chute, so that the trucks can be driven beneath it and loaded, and there

will be no interruption of the work of the shovel.

The accompanying illustration shows the method used in the construction of the approach of the new \$5,000,000 high level bridge at the West Subway at Cleveland, O., where all of the material taken from the subway in cars was placed in hopper loading bins, 35 trucks being used to haul it away. The only limitation to loading was the skill of the drivers in working at the bins.



Where Truck Time is Valuable the Steam Shovel and Loading Pockets Afford the Greatest Practical Economy for Contractors.

Loading Power Trucks with Steam Shovels



When Construction Cannot Be Permanent, Loading Trucks with Steam Shovel Will Afford Good Economy if Vehicle Headway Is Well Planned.

The value of quickly loading power trucks is understood practically by all who own or utilize them, and wherever the character of the work is such that special equipment can be operated there is no doubt of the economies that can obtain. When excavating is necessary the greatest economy is with the largest units that can be worked and steam shovels are the most satisfactory equipment in general use. These have the

advantage of being portable, and can be readily moved to obtain uniform depth. This is really important for where the area that can be worked on can be cut to a specific level this insures against sharp grades on soft surfaces, which minimizes fuel consumption and repair and maintenance expense.

Operating conditions must govern the manner of loading. By this is meant that good judgment dictates the smallest

expenditure for facilities. No contractor will care to invest in equipment that cannot be made continuously useful, even though it might be economical for a specific work. By good organization and careful supervision a very satisfactory and economical service can be obtained by working a sufficient number of trucks to keep a steam shovel operating continuously, and if the headway of the trucks is well timed the machines need not be kept waiting longer than is necessary to fill them.

Steam shovels with three-quarter yard buckets have rated capacity of from 40 to 60 cubic yards an hour, and those with 1½ yard buckets have rating from 75 to 110 cubic yards. With trucks carrying loads of from four to five cubic yards, power shovels need lose no time and the trucks can be kept moving. The times of loading, hauling, dumping and returning must be determined and a sufficient number of trucks used to have one ready for loading just before one is loaded. This means that a part of the time two trucks will be at the shovel and the others at the dump and on the road. When the time schedule has been determined the drivers must be kept to it by careful supervision. The accompanying illustration shows two trucks at a big shovel at Orient Heights, Mass., excavating filling for an extension of the Metropolitan Parkway system at Revere. In this work the only other possibility would be a portable hopper bin.

Electric Tractor and Trailer for Steel Haulage

Heavy constructional steel is used at all United States navy yards, for more or less repairing is usually in progress in times of peace, while in the event of war the work will be largely increased. Much of this steel is in the form of beams, trusses and girders, some of considerable weight, and always of such length that it is difficult to handle.

A tractor and trailer unit specially designed for handling steel at the Bremerton, Wash., navy yard, located at Puget Sound, has been found exceptionally economical for this work, and its utility is such that it has been equally serviceable for many other purposes.

The tractor has a short wheelbase, but the frame is 132 inches length and 60

inches width, the front of the frame being fitted with a heavy bumper to protect it in the event of coming into collision with any object. The frame is decked with heavy sheet steel. The seat for the driver is at the left side of the frame with a small footboard, the steering column being bolted to the frame. The power battery is suspended from the center of the chassis between the wheels.

On the platform of the tractor is a steel turntable, very heavily built, on which one end of a long steel unit may be carried. The trailer frame is similarly constructed, but has no bumper and no seat for a driver. On the steel deck is a heavy turntable. At the ends

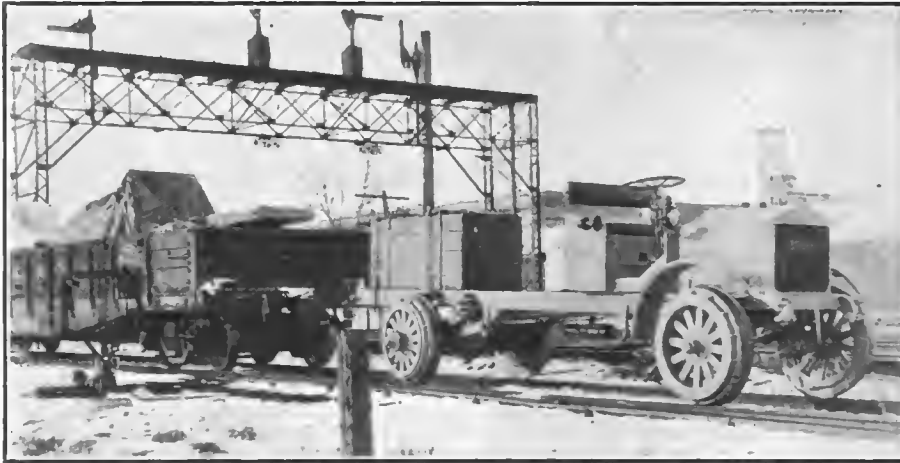
of the frame side members are towing hooks. The wheels are cast steel, 24 inches diameter and are shod with rubber tires.

The tractor is equipped with a 30-cell, 21-plate lead-acid battery, that will drive it at maximum speed of 5½ miles an hour and the mileage capacity is 30 normally. The tractor has a towing cable 50 feet long, which is made fast at the center of the rear end of the tractor frame, the ends being hooked on the trailer frame. The load capacity of the two units is six tons, and a beam 60 feet long can be carried on the turntables, these pivoting so that comparatively sharp turns can be made, which would not be possible were the beam carried on the decks. With this heavy material can be handled economically.



Electric Tractor and Trailer with Platform Turntables, Designed for the Use of a United States Navy Yard, for Hauling Long Structural Steel of Heavy Weight.

Freight Car Switching with Power Truck



Selden Truck Equipped with Flanged Wheels, Used for Switching Railroad Cars in and About the Selden Plant at Rochester.

Shortage of labor and greatly increased number of freight cars in railroad service, as well as demands from shippers that are as constant as they are insistent, has impelled executives having control of freight transportation by rail giving much attention to yard handling, to expedite delivery and the assembling of cars, that trains can be made up in the least practical time and

consignees shall have shipments with minimum delay.

Large manufacturers locate as near railroads as is possible, having spur tracks when practical. They must depend largely upon the railroads to handle loaded or unloaded cars upon these spurs. Switching engines are usually used, but last winter when there was extreme shortage of facilities, the

Selden Truck Sales Co., Rochester, N. Y., equipped a model NL chassis with flanged wheels and a box on the frame above the rear axle to carry ballast to give traction. This was used for months to haul loaded cars from the siding to the railroad yard and from the yard to the siding. The machine was driven by an experienced man and the cars were handled with great celerity. The utility of the equipment was so thoroughly proven that there would appear to be no reason why similar chassis could not be used in all railroad yards, releasing locomotives that could be used for longer haulage. Switching engines are comparatively light, but many of these could be used for small passenger trains, and the engines used for these in turn released for freight trains within their capacity.

The switching trucks have also practical possibilities for haulage of several freight cars, for the Selden chassis hauled a car from Rochester to Syracuse with a freight of chassis and trucks that were exhibited at a show, making the run and return over the Rochester, Syracuse and Eastern railroad, an electric road, in charge of a conductor, being operated to a schedule. As these works were done in winter conditions there would appear to be large possibilities the greater part of the year at least, and continuously in some parts of the country.

Automotive Bus Replaces Trolley Service

Electric power production cost has increased enormously because of the greater expense for fuel and labor. Many public service corporations that were reasonably productive prior to the beginning of the European war have not been able to pay dividends. Fares have been advanced in many instances and yet the revenue has been inadequate to meet expenses. With larger fares the earnings have not reached expectations because of the reduction in number of passengers, for the population has been lessened by the vast accessions to the army and naval forces.

The only practical economy of fuel and labor is reduction of number of units operated, but this is reflected in the revenue. Power must be produced, so the actual saving is comparatively small, for there must be sufficient energy at all times to operate the cars. Within a year and a half many trolley roads have suspended and the trackage and equipment sold.

The use of truck chassis equipped with flanged wheels and passenger bodies is entirely practical on many roads, and such machines would obviate power house operation and afford reasonable service for smaller fares, which would encourage riding. A country club near Chicago bought an International truck chassis and equipped it for track operation to carry members who had been served by trolley cars.

With this trips were made as frequently as the guests required, the service

was complete with one man and the use of the truck reduced the cost of operation as compared with trolley cars very greatly. As a matter of fact the exclusive control of the vehicle and its use was vastly more satisfactory, to say nothing of the other economic advantages.

There appears to be no reason why tracks now abandoned could not be utilized for similar public service in many sections of the country, with whatever units were needed, and such equipment

could be used to excellent advantage by corporations that have to choose between curtailment of trips with consequent loss of earnings, or changing the present means of operating.

HARDIG JOINS REMY CO.

Joseph L. Hardig has been appointed director of advertising of the Remy Electric Co. of Detroit. He was for several years associated with the Curtis Advertising Co. of Detroit and is recognized as a very capable analyst of the automotive industry.



International Truck Adapted for Use on a Trolley Track by a Country Club Near Chicago for Private Use by Its Members.

Power Basket Elevator for Coal Trucks



Coal Truck Equipped with Rear-End Basket Elevator to Lessen the Work of the Men by Raising the Platform Shoulder High.

Much of the coal delivered, especially at residences, must be carried from the carts or trucks and placed in basement bins, or taken up stairs. While delivery is charged at flat prices a ton within various zones, and there are additional charges for each story above the ground floor, the aggregate return of the dealer does not as a rule equal the cost of the vehicle with which the fuel is hauled.

Some dealers will not make deliveries

of this class with large trucks. Others believe that crews of four or five helpers are more economical than 14 of two or three, and others pay the helpers a flat price a ton for their work, believing that they will endeavor to make as much as they can from their labor in a given time. Baskets and canvas bags, which will hold approximately 100 pounds each, that are carried by the men on their shoulders, are the usual means of hand-

ling the coal, these being filled by gravity.

Handling weights of 100 pounds or more, though there are abundant intervals for rest, is laborious work, and the men will tire, especially in warm weather. Whatever will retard unloading means loss of time of the truck. To minimize the work of the men, so far as raising the bags or baskets of coal to their shoulders, the Schwalb Coal Co., Cincinnati, equipped a five-ton truck with a basket elevator at the rear end.

This is raised and lowered by the power of the engine and consists of a cross platform on a frame slidable in upright guides installed on the corners of the body. At the rear end of the body are three outlets that can be closed by vertical gates, and from these the baskets can be filled by gravity. The platform will hold four baskets. When the baskets are filled the elevator is raised to a height so that the men can take them on their shoulders without stooping or lifting. The baskets can be filled as fast as a crew of six men can handle them normally. The device has proven very economical in service. It cannot in the form shown in the accompanying illustration be used on a rear end discharge truck, because of the lowering of the overhang of the body, which would bring the frame in contact with the ground.

Contractors' All-Purpose Truck Body

Haulage contractors are expected to do very diversified work when affording public service. The loads may be bulky and light or small and heavy, or between the two extremes. As the capacity of trucks is rated by tonnage there is every reason to carry maximum loads. Obviously the best result is obtained with a body built for a specific work. While a heavy freight can be carried in a large body, provided it is placed so that the weight is well distributed on the chassis, a bulky load cannot be carried in a small body.

Several different bodies, both in size and type, would be ideal, but changing frequently would be costly both of time and labor, to say nothing of the additional investment. Generally those who do haulage to contract have their trucks equipped with bodies of such types as there is need for, and expect to have these available so as to meet any demand. Platform and front end hoisting or tipping bodies are the type most often used.

A very well designed all-purpose contractor's truck body is shown in the accompanying illustration. This is on a large Packard chassis and one will note that the body, a wooden construction, is unusually long and wide and considerably overhangs the rear end of the chassis frame. The only disadvantage is that the degree of floor inclination is limited, for the rear end cannot strike the ground. The body is a flareboard type, with high sides and a top-hinged tail

gate, operated by a lever from the seat.

The chassis is equipped with a hydraulic hoist, so that it can be used for work where quick discharge is essential. In addition there are three sockets on each side, at either end and at the center, which take the lower ends of the stanchions of frames or racks. With these racks, which have three transverse members each, light, bulky loads can be piled high and carried safely. A light steel frame, consisting of three cross members and a center member, the ends of

the cross members fitting into sockets on the ends and centers of the upper transverse members of the side frames, affords a support for a tarpaulin cover, which can be quickly removed or kept standing as desired.

E. H. Burnett has been made distributor for Rainier trucks in Essex and Middlesex counties, New Jersey. He is president of the Standard Sales Corp. of Newark.

The annual convention of the Michigan Good Roads Association will take place at Detroit Sept. 2-6.



Rear-End Discharging Hydraulic Hoisting Body Equipped with Removable Rack Sides and Cover-Supporting Frame.

Small Trucks for Quick Coal Delivery



GMC Truck with Power Hoisted Body, Adapted for End Discharge, Either by Dumping or Chute Delivery.

Coal dealers and others who deal in heavy material of small value realize that the only possibility of economical delivery is by the use of two types of vehicles—the large unit with maximum capacity, when loading and unloading can be done rapidly, or the small, fast unit with such equipment that minimum time will be required for discharging. Unless the loading can be done from elevated pockets by gravity there will be

so much loss of time that there would be doubtful economy with any form of power truck.

A truck that has been designed for coal delivery after careful study of the requirements is a two-ton unit equipped with four speed ratio transmission gear-set, and a body that can be operated either by hand or by power, the power hoist being operated by the driver from the seat by throwing a lever that meshes

or unmeshes the gears of the take-off. The hoist is a cross shaft and train of gears, driven by a worm shaft and worm wheel, that actuates a pair of power arms connected with the body.

The position of the power arms determines the height of elevation of the body. At full height the body is elevated three feet above the rear of the chassis frame, and the floor is inclined 30 degrees. But the front end only of the body may be elevated until the floor is inclined to an angle of 50 degrees. The change from rear elevating to rear dumping is made by releasing a cable from the end of the body, which is done from the seat.

The body is steel with a wood division board and has 92 cubic feet capacity, this being sufficient for 4600 pounds of soft coal and 5000 pounds of anthracite coal. The tail gate is fitted with an outlet and a chain for carrying bag coal. The top tail gate is removable. The time required for elevating or lowering the body is 90 seconds. The body cannot fall while loaded, the worm shaft and wheel serving as an effectual brake. The speed of this machine is 15 miles an hour. In the accompanying illustration the truck is shown with the body elevated to make delivery by chute over a fence. This is an example of its general utility, as for general work the truck can be handled by the driver, and helpers are not usually needed.

Coal Storage Pockets for Gravity Loading

Coal storage, no matter how the bulk shipments are received, must be with the object of minimizing handling. If piled on ground or platforms the loading of vehicles for distribution must be with loading machines. If it can be taken from cars or vessels by buckets or conveyors it may be carried to pockets or bins so elevated that loading from them may be by gravity. This is very generally the rule with water front yards.

Wooden pockets are the most general construction because they have the advantage of smaller initial investment, but they have the disadvantage of more rapid deterioration. They require heavy lower frames because of the loads and they are seldom so constructed that vehicles can be moved quickly and freely under them. They can be planned, however, so that all of the outlets can be into a single roadway, but one objection to this is the necessity of having sufficient width of drive so that there shall be no obstruction of the passage by standing carts or trucks. Ideal loading conditions would dictate such open area that vehicles can be driven to or from the pockets in any direction. This is not always possible because of location.

The use of cement construction for pockets has much to recommend it, especially where long life is desirable, but the cost is considerably greater. When resources will justify cement, however, it is undoubtedly a good econ-

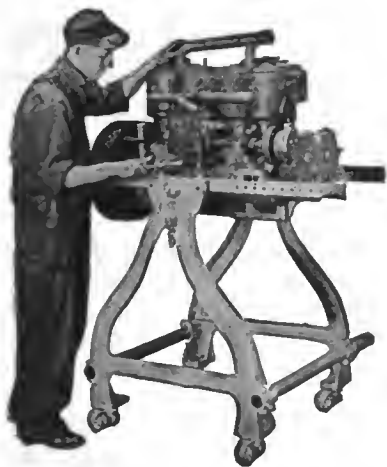
omy. Cement pockets require heavy foundations and where the yard space is limited there is need of giving careful attention to the area for loading the vehicles.

The most satisfactory form of coal pocket is steel, which will have the largest capacity for a given size, which can have floors so formed that complete discharge of pockets can be obtained without trimming, and which can be so covered that the coal can be protected

against rain, for wetting might result in freezing in cold weather. Not only this, the pockets can be elevated so as to have abundant light, greater freedom from dust, and with trestle or bridge sub-structure the largest space can be provided. Pockets of this type will have the greatest life and, as with cement construction, be practically free from danger of fire loss. The accompanying illustration shows the possibilities for operating, with a level, smooth-paved yard, with steel structure and highest grade equipment.



Steel Coal Pockets to Obtain Quick Loading. Built by a Detroit Concern—An Ideal Type of Storage Facility.



Continental Motor Stand.

CONTINENTAL MOTOR STAND.

Repairing an automobile engine is an important work and only by doing the repair well and quickly can the repairer make a success of his business. The Continental motor stand, manufactured by the Continental Auto Parts Co., Knightstown, Ind., is a device which makes for efficiency in that when the engine is mounted upon it it may be turned to the most convenient position

for repair. The stand is adjustable to practically any size automobile or truck engine. It is made of the best of materials and fitted with wheels so that it may be moved easily to any part of the repair shop. With the stand comes all of the necessary bolts and clamps to secure the engine into place.

MARVEL REBORING MACHINE.

The Marvel Reboring Machine, built by the Marvel Machinery Co., Minneapolis, Minn., is designed for reboring cylinders and is said to be accurate to within .005 of an inch. The machine is 44 inches high and occupies a floor space 21 by 60 inches. The boring bar is $2\frac{15}{16}$ inches diameter and has a boring length of 15 inches, long enough for the longest stroke engine. With the machine are furnished five boring or cutter heads ranging from three inches to eight inches in diameter.

The machine, when operated at a speed of from 50 to 60 revolutions a minute of the boring bar, will bore a depth of about $1\frac{1}{4}$ inches a minute. Drive is by tight and loose pulleys to beveled gears with a gear ratio of four to one.

The face plate will hold practically

any size cylinder block, and claim is made that a mechanic can attach, center properly and bore any ordinary four-cylinder block in from two to three hours with but little practise. Perfect parallel-



Marvel Reboring Machine.

ism of the cylinder bores is assured because the face plate is built on the machine, and when once lined all bores must be the same.

The manufacturers claim that even with the largest and deepest cylinders there is no chatter or vibration in the boring bar.

Lee Portable Outfits for Unloading Cars

For years open top cars have been used by railroads for hauling materials that are not affected by exposure to weather, simply from the fact that these are the cheapest units that can be built, and they can be loaded by gravity. The older cars are wood and the latest types of steel, some of these being designed to discharge the cargoes by gravity from chutes when elevated, or if used with some forms of unloading equipment.

When cars are so constructed, or the conditions are such that they cannot be unloaded save by shoveling, the cost for labor is considerable. Unless carts or trucks are always available when wanted the shoveling may not be continuous and time of the men may be lost. The Lee portable unloading equipment consists

essentially of a steel frame mounted on wheels, so that it may be moved quickly and easily, that is adjustable as to height.

On the top of the frame is a Lee body, which is built of steel plate and angles with straight ends and rounded sides, strongly braced, with the tops of the sides and ends capped. The body rocks on top of the frame, being held rigid by braces when centered for loading, the rocking movement being limited by chains. The body can be turned so that its lower side will have an angle of about 65 degrees, which will insure the discharge of any material, even bituminous mixtures, and the edge will well overhang the side of any vehicle beside it. The body can be centered or it may be

rested against the side of the railroad car while being loaded. The unloader body may have capacity of from four to five yards, if such sizes are desirable, or smaller, according to the load ratings of the haulage units.

One or two unloaders can be used with a railroad car, the number of shovelers who fill the rocking bodies and trucks depending upon the length of haul. Dumping is practically instantaneous. With this equipment labor and truck time can be largely economized, for there need be no cessation of work or stopping the trucks save for loading and unloading, both of which are by gravity. The accompanying illustration shows two units in different work. Obviously a truck and trailer units can be loaded at one filling provided there is a sufficient number of unloaders.



Lee Portable Unloaders for Contractors' Use: At Left, Loading a Trailer Fitted with a Lee Side-Dumping Body Hauled by an End-Dumping Truck; at Right, Lee Outfit Beside a Railroad Car Loading a Truck.

TRACTORS ADAPTABLE

*Are Practical for Hauling Wagon or Trail
Heavy Machinery, and Are Ideal Power*

THERE is no question of the diversified uses that may be made of power on farms; a man of mechanical ideas could undoubtedly do a considerable part of the work that is or has been done manually. But the farmer's work is in different places and for the greater part of it small power units would serve admirably. There are instances where from one to five horsepower would be adequate, and some of the larger operations might be best done with much larger engines, perhaps up to 25 horsepower. The farmer cannot buy engines for every work. Even were electric power available there would not be sufficient use of any one unit to justify buying separate motors, so that at best the farmer can only provide one or two machines—probably one, save in rare instances.

This being so the farmer wants what will be sufficient for field work, and yet can be used with economy of fuel and lubricant and maintenance expense in whatever other work he can do with it. The powerful tractor might save him time while plowing and planting and harvesting, but against this economy would be extravagance of large consumption of fuel and other operating cost if it were used for work where much less power were required. There are numerous uses for which small engines would be preferable, and the greatest convenience would be one permanently located for each machine or purpose. Next to this, with a view of minimizing expense, a single plant that can be moved wherever required is best for general purposes.

There are works where daily use is desirable—perhaps necessary—such as pumping water, driving lighting plants, milking machines, etc., but most farm work is intermittent, depending upon seasons. This applies to power only, but field cultivation is done only part of the year. Tractors can be used for road haulage, but they are not comparable to power trucks save when the movement of loads is comparatively slow. There appears to be no reason, however, why farm work could not be better systematized so that it could be done in such order that machinery could be used more continuously.

But in addition to this there are other objects that should receive consideration. For instance, one man owning a tractor could contract with others to do work for them, to a determined schedule, so that the machine could be used. This would possibly lead to what might be termed community work. Besides this, road work is necessary and this could be done at different times, constructing, grading and repairing in the spring, summer and autumn, and breaking paths through snow in the event of storms. Haulage work with trailers could also be done, and the nature of this would depend largely upon the needs of the community.

What has been stated applies to farm tractors, but if these machines are adapted for road work, that is, by cleating the wheels, they could be used for numerous other work. For instance, trains of heavy trailers could be hauled considerable distance. The time would not be fast as compared with trucks, but the greater capacity of the units would be the material value. Tractors could be utilized by industrial plants, for haulage of units in the yards, taking the place of or serving instead of other power, for



TO INDUSTRIAL NEEDS

er Trains on Tracks or Highways, Can Work Plants, Aside from Farm Operations

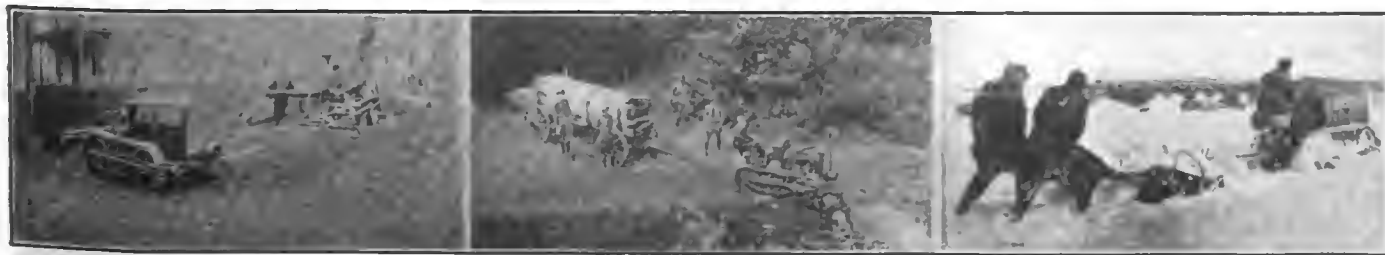
drawing small cars between factory units. They could be worked for switching cars, they could be used for delivering heavy materials or products, and they would serve with power take-off equipment for all purposes for which portable power plants are now regarded as necessary, combining the values of road or track haulage with hoisting, and having the advantage of mobility.

There is a large measure of economy in the combination of power plant and haulage unit from the viewpoint of the road and building contractor. Tractors can be used in a great deal of excavation work, for there are types that can be driven on soft ground without loss of traction. In fact for some works trailers with free revolving tracks instead of wheels are especially suited, and machines of this type can be driven over ground devoid of paths. One of the experimental services of the United States army in Texas proved that tracklaying tractors could haul enormous loads on trailers through desert sand quite as practically as on highways, but wheeled trailers were not as serviceable because of sand surfaces into which the wheels sank.

Slow-moving tractors, with broad wheels or tracks, cannot be objected to by road builders. The distribution of the weight over large surface areas lessens the pressure the square inch to a point where there is consolidation of the road instead of disintegration from the tractive effort upon the roadway. Such wheels do not cause ruts. To the contrary, the use of tractors "irons" the roads and levels the surfaces.

Tractors have been believed generally only suited for agricultural work. As a matter of fact they can be used by innumerable industries, especially with adaptations of tracks and wheels with reference to the type of roads and streets on which they are driven. The fact that their utility is not lessened by the nature of the ground, that they can be worked where power trucks and animal vehicle capacity is much reduced, is another utilitarian value that should be considered by tractor salesmen. As a matter of fact the tractor possibilities are seemingly only limited by the resourcefulness of the owners and operators.

The series of illustrations at either side and the foot of these pages demonstrate varying possibilities in farming operations and industrial work. Beginning at the top of the left page and following around to the top of the right page these show a Cleveland tractor that is successively plowing on a steep grade, disc harrowing, planting, cultivating, peg harrowing, operating manure spreader, cultivating between rows, cutting clover, mowing hay, reaping and binding, sawing wood, hauling a trailer loaded with lumber, breaking a snow path in a road, hauling car on a plant industrial railroad, switching freight cars, drawing a portable power plant for a contracting builder, distributing road material, scarifying a road, scraping a road and pulling a train of trailers for a road builder. So far as the farm work is concerned what are shown are all field operations, and the illustrations of road clearing and construction and industrial plant railroad switching works are but a few instances of what can be done practically with tractors.



Maryland Demands Passing Truck License

If Governor Harrington of Maryland has his way, and seemingly he is approved in his attitude by state politicians, all power trucks from other states must be licensed in Maryland if driven upon Maryland highways. There is a provision in the Maryland law that grants to non-resident owners of automobile vehicles the same use of Maryland roads that the laws of the states in which they reside grant to Maryland automobile owners. There is no specification in this provision, but Governor Harrington maintains that it applies only to the use of passenger cars and that all trucks from other states that are driven upon Maryland highways must be licensed in Maryland and pay the regular license fees of the state.

There is no question that the reciprocity clause, so-called, of the Maryland law was enacted to obtain similar concession for Maryland owners in other states and that Maryland owners have and do now benefit through this clause. The privilege, however, is dependent upon the continuance of the law as it now obtains.

Since the railroads have been burdened beyond capacity, shipments have been made from various Atlantic coast

cities to Baltimore and Washington by trucks. The Maryland highways, poorly built and not well maintained, have been worn. Constant repair has not been made. The government has offered to pay a part of the cost of upkeep of highways on which truck trains in its service are driven in considerable numbers. Maryland's attitude during the session of the legislature was to double the truck tax for this year and to again double it next year. Whether or not this policy will be adhered to is problematical.

The fact remains that a great deal of the traffic is resultant from government necessities; that it is interstate freightage; that the trucks are licensed and the owners have complied with every legal requirement. Maryland, alone, of all states, now seeks to place a very heavy tax on trucks, but is seemingly willing to have Maryland owners continue to enjoy the exemption from taxation in other states by maintaining a policy of differentiation, if such is legally possible. If a Maryland governor can suspend a law, the governors of other states can do likewise.

Seemingly a condition has now arisen when Congress can justly enact a law requiring Federal registration of trucks, which will be recognized in all states, which will divorce truck licensing from state politics and will insure uniform rates throughout the country. The condition is indeed serious, because if Maryland establishes a precedent, other states may follow, and similarly exact truck taxes without limit.

TRANSCONTINENTAL RECORD FOR MAXWELL TRUCK.

A Maxwell truck loaded with a freight of 2200 pounds was driven from San Francisco, Calif., to New York city, making 3394.3 miles in 18 days. The machine was driven by Ray McNamara, and the original intention was to make the trip in 34 days, or an average of approximately 100 miles a day, but the conditions were so favorable that an average of about 200 miles was made, reducing the planned time nearly a half. The longest day's mileage was 272.5, from San Francisco to Reno, Nev., the first day, and the shortest, 98 miles, from Philadelphia to New York, the last day. Nine of the days the mileage was 202 or more. The record of the drive by days is as follows:

Starting San Francisco, Cal.	Daily Miles.
July 17—Reno, Nev.	272.5
July 18—Austin	184.8
July 19—Ely	157.3
July 20—Fish Springs, Utah.....	144.2
July 21—Salt Lake City	147.5
July 22—Green River, Wyo.	212.9
July 23—Rawlins	125.5
July 24—Cheyenne	177.2
July 25—North Platte, Neb.	232.6
July 26—Columbus	231.8
July 27—Atlantic, Ia.	143.3
July 28—Iowa City	219.1
July 29—De Kalb, Ill.	171.2
July 30—Fort Wayne, Ind.	246.5
July 31—Canton, Ohio	218.0
Aug. 1—Bedford, Pa.	210.0
Aug. 2—Philadelphia, Pa.	202.0
Aug. 3—New York city	98.0
Total mileage	3394.3

Elevating Bottom-Discharge Coal Trucks

Where coal delivery can be made by gravity discharge instead of carrying the policy of coal dealers is generally to make the loads as large as possible. Very frequently the distance from the curb or where the truck may be placed will be from 18 to 30 feet, and an end discharging body would not be sufficiently high so that the coal would fall through a chute, unless very short. This might not under ordinary conditions be inclination that would be necessary to discharge across a sidewalk.

The only type of body that would be suited for discharging through a chute if the distance is increased is what is known as an elevating type, so that the floor is at the same height, and that the street may not be unnecessarily obstructed these must discharge from the side. That the load shall flow from the outlets without trimming the body must be lowest in the center.

An example of a body of this type is shown in the accompanying illustration. This is a 7½-ton chassis, on the frame of which is constructed a frame that carries the body when lowered. The body itself is built of wood with a steel frame, reinforced with steel straps. The floor is inclined so that the load will center at the outlets at either side, these having sliding gates by which the flow can be regulated. Secured to the bottom

frame of the body are four heavy steel vertical members that are slideable in guides on the chassis frame and the super-frame above it.

On the super-frame are two cross shafts, on each of which is a pair of steel arms, strongly braced and cross tied. These arms are sharply curved until the

ends are at right angles to the main sections. On these shafts are steel drums. Midway between them is another shaft with a similar winding drum. Chains are carried around these drums so that by turning the center shaft one direction the arms are swung against the bottom of the body, elevating it, or when turned the other direction the body is lowered. When the arms are fully elevated the body rests

evenly on them, and there can be no further movement. The illustration shows the body at full height, and the man standing beside it can just reach the gate lever. The chute has three sections extended, and there are two more carried on brackets at the rear of the chassis frame.



Elevating Bottom-Discharge Side-Chute Body for the Delivery of Coal Direct from the Street to the Bin, a Type Adapted for One-Man Operation.

OSBORN-MACMILLAN, INC., IS INTERNATIONAL AGENT.

Osborn-MacMillan, Inc., 27 Jersey street, Boston, has been made agent for that city and vicinity for International trucks by the International Harvester Co., which until recently operated a sales department at its New England branch at 43 Somerville avenue, Somerville, through which all retail and wholesale transactions passed. The company will continue to supply all its representatives in the New England states with machines, but individual sales will be made by dealers and not by the company. The company is composed of George L. Osborn and L. W. MacMillan, the former being known as a salesman of motor vehicles for 14 years and the latter being proprietor of the MacMillan Engineering Co. who prior to organization were associated as consulting automobile engineers. The company has its offices, salesrooms and service station in Jersey street, and the facilities are sufficient to meet any demand that may be made upon it.

ALCO TRUCK SPARE PARTS.

The obligation of the American Locomotive Co. to furnish spare parts for Alco trucks and cars, originally made to cover five years, expired Aug. 13, and because the demand for spares is sufficiently large to justify production and the necessities of locomotive manufacturing preclude continuance, the company has sold its stock of parts and the right to produce others to the Puritan Machine Co., Detroit. The Puritan company has made agreement to supply Alco vehicle owners with spares for five years ending Aug. 13, 1923. The Puritan company now supplies spares for 164 different makes of power vehicles. Orders for Alco spares can be sent to the Puritan Machine Co., Providence, R. I.; International Motor Co., New York, N. Y., and Ralph J. Chandler, Los Angeles, Cal.

NEW MASTER TRUCK PLANT.

Work is shortly to be begun erecting a new plant for Master Trucks, Inc., Chicago, demand for production necessitating increased facilities that could not be obtained without separating some of the departments from the present factory. The company is now producing from eight to 10 chassis a day, and this output will be largely increased. Operating less than 18 months the company has twice outgrown its quarters.

Ground has been broken for the construction of the new foundry of the General Motors Corp. at Saginaw, Mich., the first unit of which will cost \$1,100,000 and will employ 800 or more men.

Victor F. Dewey, who has been made general manager for the Detroit Steel Products Co., Detroit, was formerly vice president and general manager for the Detroit City Gas Co.

Isabella County Backs Truck Company

Michigan is the state of automotive successes without question, and from its factories and shops more power vehicles are produced than elsewhere in the world, but no concern engaged in the industry was ever established as was the Transport Truck Co., Mount Pleasant, which seemingly has been insured a considerable volume of business that would not under ordinary circumstances be obtained without an aggressive sales campaign, at least locally.

The Transport Truck Co. was projected by Milton A. Holmes, formerly vice president and sales manager of the Republic Motor Truck Co., who believes that the marketing possibilities of trucks are practically unlimited, and when he resigned from the Republic company last April he devoted himself to organizing a company to a plan he believed would be especially attractive to men who were both prospective investors and truck owners.

He decided that Mount Pleasant, though a small town in Isabella county, would be the most advantageous location, and with the financial support of H. E. Chatterton, A. E. Gorham, T. H. Battle, E. J. McCall and several other well known Michigan financiers, a proposition was made the citizens of Isabella county to become stockholders in the company. The response to this was subscriptions for varying amounts from more than 800 persons within a week, they collectively taking about 50 per cent. of the \$1,000,000 capital of the company.

The company has obtained the use of a building suited to beginning produc-

tion pending the erection of a plant, which will probably be in readiness for occupancy in about 90 days, and, meantime, manufacturing will be begun—probably about Sept. 1—with an initial output of four or five trucks a day. When the main factory is equipped the number will be considerably increased. Many of the stockholders of the company are substantial farmers, who will be interested in the machines the company will build, and a considerable number will, no doubt, be disposed of to them. The company will not be controlled by one man or a small group of men, and it will be directed to produce both volume and quality.

The Transport trucks will be internal gear driven and constructed of standard units, to a design that is expected to be approved by those experienced in truck engineering, and it will have qualities that will recommend it to those who want to obtain dependable, reliable machines. Mr. Holmes has had broad experience in truck sales and he is widely and favorably known to truck dealers the country over. He maintains that the number of inquiries already received by him assures a very general demand for Transport trucks. Mr. Holmes begun the organization of a sales department coincident with the organizing of the office and production divisions, and the foundation for selling and distribution will be well established by the time production will be commenced.

A quarterly dividend of one per cent. on common stock and 1½ per cent. on preferred stock has been declared by the Studebaker Corp., payable Aug. 31 to stockholders of record Aug. 20.

The Continental Motors Corp., Detroit, and Muskegon, Mich., has declared a quarterly dividend of 1½ per cent. on its common stock, payable Aug. 20 to stockholders of record of Aug. 10.



Winther Three-Ton Truck with Standard Express Body and Standing Top, with 40 by 8-inch Goodyear Tires, One of a Series Delivered to the Quartermaster Corps, U. S. A., for Distribution of High Explosives.

Employees of Clark Plant Have New Auditorium

The plant of the Clark Equipment Co. at Buchanan, Mich., which is designed to have high industrial efficiency, was originally operated by two concerns, owned by the same interests, and when the units were designed one of the main objects of the owners was to afford every condition and facility that would be essential to the convenience and comfort of the employees, as well as insure the largest degree of manufacturing productivity.

The buildings were constructed to be thoroughly lighted, heated and ventilated; sanitation was given careful attention, the workers were safeguarded against dangers, and the arrangement of the tools and equipment was such that labor and time could be economized so far as possible for engineering science to devise. In addition, the companies beautified the grounds of the works, locating trees and shrubs, with walks and drives so that the lawn would be protected. The purpose was to have the plant quite as attractive without as it was within. While the works have been expanded to meet the requirements of increased business, the environments of the buildings have been preserved.

But the welfare of the employees was still further considered, with the result that the company erected an auditorium at the plant that is in effect a part of the structures. Externally it is two stories high, and there are three wide entrances at the front which lead into an auditorium that is 86 feet deep and 56 feet wide, having a complete stage, amply lighted and provided with scenery to meet practically any requirement. Half of the floor is level, so that

it may be used for athletic purposes. There are seats for 625 persons. Besides, there are retiring rooms for the men and women and the usual apartments required in such structures. The building is well lighted and ventilated and the furnishings are artistic. Included in the equipment is a moving picture outfit. The auditorium is now available for gatherings of different kinds, with weekly entertainments, one of the features being display of moving pictures educational in character, all of which are for the benefit of the employees of the works.

CHEVROLET PLANT TO BUILD KITCHEN TRAILERS.

The plant of the Chevrolet Motor Co. at Tarrytown, N. Y., is to be increased by the erection of a three-story structure, 80 by 140 feet, to be completed within 60 working days, which is to be given over to the construction of a large number of kitchen trailer units, which have been ordered by the government for army service.

A large addition is to be made to the plant of the General Aluminum & Brass Manfg. Co., Detroit, which will include four units. The total cost will be in excess of \$300,000.

The net profits of the B. F. Goodrich Rubber Co. for the first six months of 1918 is stated to be \$7,150,000, a large gain when compared with profits for 1917 of \$10,544,677.

BUSINESS OUTLOOK BRIGHT.

General Manager of Sanford Motor Truck Co. Optimistic of Future.

Secretary and General Manager E. A. Kingsbury of the Sanford Motor Truck Co., Syracuse, N. Y., is extremely optimistic of the business future of the power truck industry. In an interesting interview he stated:

"Few classes of business houses there are today that are not the beneficiaries by motor delivery. Farmers, stock raisers and fruit growers have had the message of motor delivery impressed upon them by the need of getting crops to market in these days of shortage of man power and high cost of horse feed. They have also had an object lesson in seeing the caravans of trucks hurrying by.

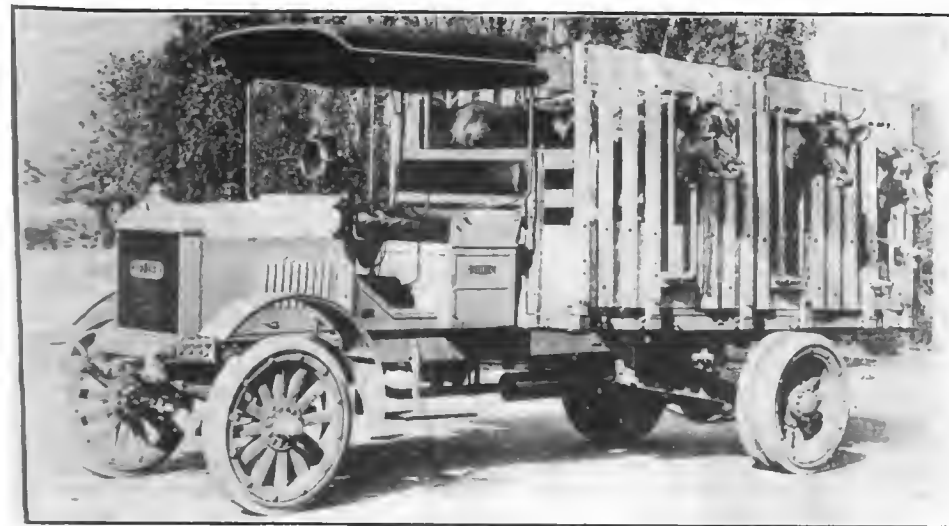
"The same might be said of the business concerns in the villages and cities and especially by those men actively engaged in inter-city trucking. I think the great demand for trucks will grow mightily, and that the impetus as given by the tragic results of the war will be felt for many years to come. Coincident with the huge growth of motor trucking is the great need for better highways and stronger bridges. That those will come and come soon is pretty sure to happen."

JOIN MIDLAND FORCES.

Bert B. Fornaciari, secretary and general manager of the Harvey Motor Truck Co., Harvey, Ill., for nine years; W. B. Burgess, in charge of the cost, time and stores departments of the same company for 2½ years, and C. H. Brauer, of the engineering staff of the Buda Co., Harvey, have associated themselves with the Midland Motor Car and Truck Co., Oklahoma City, Okla., the first as production manager and chief engineer, the second as assistant production manager, and the third as assistant engineer.



The New Auditorium for the Employees of the Clark Equipment Co., Buchanan, Mich.: Above, the Front Entrance; at Left, Looking Toward the Stage from the Entrance; at Right, an Evening's Audience, Looking from the Stage.



Selden 3 1/2-Ton Truck Equipped with Special Six-Strut Body for Carrying Cattle. Owned at Pittsford, N. Y.

SEWER-CLEANING OUTFIT FOR CITY SERVICE.

The city of Cambridge, Mass., has in the service of its Department of Public Works a Federal 3 1/2-ton truck chassis equipped with special apparatus for sewer pocket cleaning. The fittings aside from the chassis were made in a local machine shop from drawings furnished by L. M. Hastings, the city's engineer. The chassis is fitted with a steel body having three cubic yards capacity and a power hoist. On the right side of the chassis frame is mounted the base of a jib crane, which is supported by a diagonal brace from the top of the standard to the opposite frame side member and by a rod extending to the forward end of the chassis frame.

On top of the jib of the crane are two large sheaves that carry a chain that is used for hoisting. On either side of the transmission gearset is a power takeoff, that at the right driving the chain hoist, and that at the left driving a small air compressor. Both of the takeoffs are the chain and sprocket type.

On the chain is an orange-peel bucket that has four jaws that are opened and closed by compressed air. When the bucket is dropped into a sewer pocket the jaws open and are closed as the bucket settles into the sand or dirt. Then the bucket is hoisted by the chain, swung over the body and emptied. The truck engine supplies all the power. The equipment greatly economizes the time of the truck, and with a crew of three men can do the work of a considerable number of animal carts. From every point of view the combination is very useful and a decided saving. When there is no use for the truck for sewer cleaning it can be utilized for general purposes, so that it can be kept at work practically throughout the year.

The Biggam Trailer Co., Corunna, Mich., is now producing an average of 32 trailer units a day, which production is to be increased as additional help is obtained. The company has a large government contract.

Boston Truckmen Are Swindle Victims

The Boston Commercial Motor Vehicle Association has undertaken the protection of its members, and, incidentally, all other truck dealers, against the operation of one or more swindlers who have operated in that city, causing considerable loss and a great deal of trouble for those with whom they assumedly did legitimate business.

The plan of operation is not new except that it has not been undertaken with truck dealers. According to statement made to the association by one of its members, a man bought a truck, making a small initial payment and giving notes for the remainder of the purchase price, this being a method of sale that has been very general with truck dealers.

The buyer received the truck and began to use it. When the first note was due the maker visited the dealer and asked for an extension of time, not being able to meet it. This request was granted, and when the extended note came due the dealer was informed that it could not be met—that the buyer would surrender the machine and that it could be found in a specified garage.

When the truck was sought at the garage the dealer learned that it would not be released until a bill for fuel, oil and repairs and other expenses incidental to housing and maintaining it was paid. There was no way of recovering the machine unless the garage bill was settled. From the viewpoint of the dealer the buyer had the use of the truck from the time of delivery for the first payment, and had all the expenses of operating it charged, knowing that the machine would be regarded as, and could be held for, security for any bills that might be incurred.

The association through its attorney has presented the facts to the state district attorney with a view of determining what legal safeguards can be adopted by the members, and, in fact, by all dealers to protect themselves. There is, of course, a different aspect in the case of an individual who is honest and through misfortune cannot meet his obligations, which is seemingly a risk that must obtain with any deferred payment transaction. The victim of the particular instance cited maintains that if there should be collusion to defraud between the buyer and the garage owner, or there is deliberate intent to evade responsibility after the truck has been bought, there ought to be, if there now is not, legal means to obtain redress or obtain criminal prosecution. The association purposes to protect its members by all means against what appears to be deliberate swindle. This will probably necessitate new forms of sales contracts that will have necessary legal provisions.



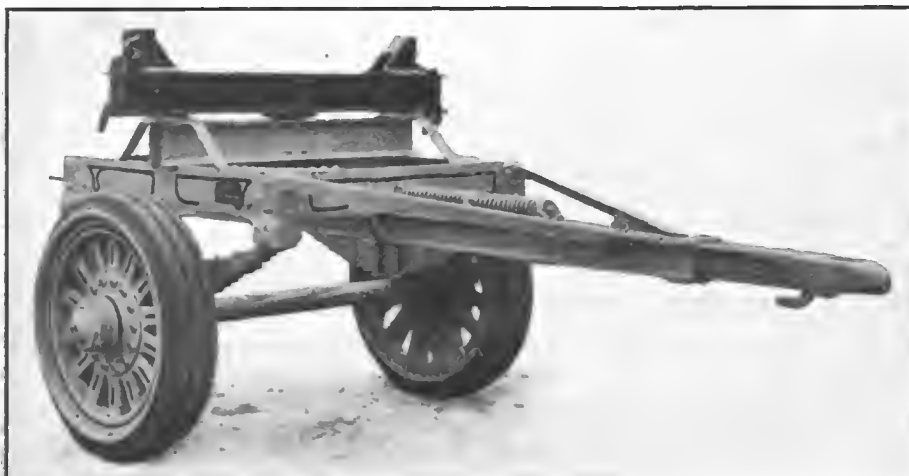
Federal 3 1/2-Ton Truck Equipped with Jib Crane and Power Bucket Hoist, with End-Dumping Body, Adapted by the Cambridge, Mass., Department of Public Works for Sewer Pocket Cleaning.

WARNER TRUCK TRAILERS FOR HEAVY HAULAGE.

Trailers and semi-trailers are built in many types and sizes by the Warner Mfg. Co., Beloit, Wis., for use with passenger cars, trucks and tractors, these including both two and four-wheel trailers. Some of these are suited for what may be regarded as fast work—that is, they can be used with vehicles driven at considerable speed, as passenger cars, and others for what is designated fast delivery with cars or light trucks.

The company specializes a series of two and four-wheel trailers for heavy duty which are designed to have large capacity with ample margin of safety and great endurance. These are in different sizes and types, a typical unit, which is designated as model D-30 and built for large loads, being shown in an accompanying illustration. The trailer is two-wheel and its rated load capacity is 11,000 pounds, so that when coupled to a truck of similar rating a load of 22,000 pounds can be hauled.

As will be noted, the two heavy wheels



Warner Model D-30 Two-Wheel Pole-Drawn Trailer, Constructed for Haulage of Lengthy Materials or Lumber.

are mounted on a round dead axle and on long semi-elliptic springs secured to the axle is a rectangular frame of steel channel section, the springs being pivoted in the forward hangers. Across the top of the frame is a substantial cross member, with strong bracing. On this cross member is a bolster mounted on a pivot, movable dogs being placed on the bolster by which any load, from a single log or pipe to capacity, may be secured against side movement. The dogs are fastened to the trailer by chains. A similar bolster is built to mount on the truck or tractor, that is supplied as an extra. The pivoted bolsters prevent strains upon either truck or trailer when turns are made.

The drawbar of the trailer telescopes in a rectangular steel section pole, being cushioned with a large buffer spring that absorbs the stresses of starting and stopping, the pole being braced with heavy steel diagonals extending from the end of the frame. The drawbar is fitted with a Warner patented ball and socket coupling, which adjusts automat-

ically to any position, so that the draft is positive without strain.

TRUCK OWNERS' CONFERENCE.

The first of a series of 19 two-day conferences, to be held in different cities during the next 10 months by the Truck Owners' Conference, Inc., will take place at Detroit, Mich., Sept. 19-20, at the Board of Commerce building. The programme will include a number of addresses by Detroit speakers, each of whom is said to be a specialist, which will be followed by discussion. The subjects to be considered will be diversified, but all will relate to obtaining economies of cost and labor and greater efficiency from operating units. Naturally, all savings are obtained through records, organization and systematizing.

NOBLE TRUCK PRODUCTION.

The new factory of the Noble Motor Truck Co., Kendallville, Ind., for which contract has been made, will be built as quickly as is possible. The first unit will be 100 by 192 feet, a saw-tooth type, to

WILL SELL ELECTRIC TRUCKS EXCLUSIVELY.

The Lawrence Motor Co., Pittsburgh, Pa., has the unique distinction of giving over the sale of gasoline power trucks to market electric trucks exclusively. The company, which has been established for a considerable period, and in a section of the country where grades are extremely heavy for practically all haulage from the business district of the city, is convinced of the economy of electric machines, despite the abnormal requirement for current in Pittsburgh specifically and elsewhere generally.

The company has branches in Cleveland, Columbus, Dayton, Youngstown, Canton and Akron, O.; Erie, Pa., and Wheeling, W. Va. It is agent for Walker, Ward and Couple and Gear trucks. The policy of the main office will be followed at these branches.

GMC EXPORT CONVENTION.

The first annual export convention of the General Motors Export Co. was begun in New York city Aug. 1 and continued nearly 10 days, being concluded in Detroit. The foreign representatives numbered nine, and the convention was attended by department heads, company executives and field men. After meetings for three days in New York city there was an outing at Glenwood and a visit to the aviation field at Mineola, Long Island. The following day was devoted to meetings, and then the delegates visited the Chevrolet plant at Tarrytown, N. Y.; the Oakland and General Motors Truck Co. plants at Pontiac, Mich.; the Buick, Chevrolet and Champion Ignition plants at Flint, Mich.; the Cadillac plant at Detroit and the Oldsmobile plant at Lansing, Mich. The visitors were under the leadership of Peter S. Steenstrup, vice president and general manager, and were guests at the Detroit Athletic Club while in Detroit. During the stay in Detroit there was a dinner at the club and addresses were made by executives of the General Motors Corp. Included in the party were James M. Wheeler, B. H. Graves, F. E. Wodell, F. R. Kern, W. J. Dockstader, A. H. Stauber, E. E. Alford and H. S. Zimmerman.

FORD BRANCH TRACTOR PLANT.

A property owned by the Hamilton & Roseville Hydraulic Co., at Hamilton, O., has been purchased by Henry Ford & Son, on which will be built a branch plant for building Fordson tractors. The plant will be driven largely by water power. The site is about 30 acres and the price was about \$200,000. The works to be built will employ about 500 workers when operations are begun. According to current statement, this will be the first of five branch plants to be operated in the United States.

The sales division of the Turnbull Motor Truck Co. has been transferred from Fostoria, O., to the factory at Defiance, O.

The offices of the Power Truck & Tractor Co. have been removed from the Book building to the new plant at Bates and Livernois streets, Detroit. The plant is now being equipped with machinery and tools, and preparations for production on a large scale are well advanced.

D. P. Cartwright has been appointed manager of the New York branch of the North East Electric Co., succeeding R. J. Hardacker, who is to be manager of the company's Chicago branch.

C. A. Quizley has been made agent in Salt Lake City, Utah, for the United States trucks, built by the United States Motor Truck Co., Cincinnati, O.

PROTECT THE REPUBLIC PLANT AGAINST FIRE.

In the No. 1 plant of the Republic Motor Truck Co., Alma, Mich., which has floor space of 296,752 square feet, a fire protective service has been installed which includes 15 fire alarm boxes, each accessible to one or two departments, which will be responded to by three other departments. Besides nine hose houses have been placed close to six city hydrants, with lines of sufficient length to overlap another connection to any hydrant, so that there may be five streams of water at any one point. There is also in the building 160 2½-gallon chemical fire extinguishers, five 40-gallon chemical extinguishers and four globe dry valve and 32 globe sprinkler hydrants.

PACKARD TRUCK DIGEST.

The August edition of the Packard Truck Digest, published by the Packard Motor Car Co., Detroit, is devoted to a series of interesting statements to establish the practicality of the haulage of freight for comparatively long distances with trucks. It deals with a diversity of subjects, including the service of the Postoffice Department for the collection of parcel post packages, and presents a series of facts that are interesting to shippers and truck service operators alike. The edition is handsomely illustrated with cuts from appropriate photographs, and typographically is especially attractive. Its chief value, however, is to the man who is engaged in or has occasion to avail himself of highway transportation.

GMC STOCK INCREASE.

The stockholders of the General Motors Corporation will meet in New York city Aug. 27 to vote on a proposition to increase the common stock of the company from \$82,000,000 to \$150,000,000 and the first preferred stock from \$20,000,000 to \$50,000,000. At the same time the proposal to establish a bonus system for the employees of all subsidiary companies will be determined by the stockholders.

JOIN RENSTROM CO.

W. F. Seel and R. Wessing have joined the sales forces of the Frank O. Renstrom Co., San Francisco, Calif., distributor of Bethlehem and Atterbury trucks, the former directing sales promotion and the latter in charge of the parts department.

Hawley, King & Co. has been made Pacific coast distributor for United States trucks, the contract calling for a large number of machines for delivery in the section west of the Rocky mountains.

A sales agency for Duplex trucks has been made with the Murphy Machine and Equipment Co. for St. Louis, Mo., and surrounding territory.

GMC COMPANIES TO BUILD MANY TRUCKS.

The General Motors Truck Co., the truck building division of the General Motors Corp., is building a very large number of trucks to fill government orders. The normal production of the company is a series ranging from 1500 to 10,000 pounds load capacities. In addition to these, the Chevrolet company is producing a 2000-pound chassis and the Buick company a 1500-pound truck chassis. Statement is made that the Oakland company is to build a truck to a standard single design, and the Oldsmobile company will also make a 1500-pound chassis. The Cadillac company is now building a car chassis to meet government requirements.

NEW KELLY-SPRINGFIELD TRUCK AGENT.

Matt J. Hinkel is head of the Hinkel Motor Truck Co., which has been organized with \$250,000 capital to sell Kelly-Springfield trucks in Cleveland, O., and vicinity. The service station, which has 30,000 square feet of floor space, is at 6519-23 Carnegie avenue. Mr. Hinkel is widely known as a business man. The company will be managed by his son, Clarence M. Hinkel.

WILL BUILD WAYNE TRUCKS.

The Automobile Manufacturing and Engineering Co. has leased the former Pfeiffer works in High street, Fort Wayne, Ind., and will manufacture a truck to be known as the "Wayne" as soon as the buildings can be made ready for production and material obtained. The chassis is to be built with what is claimed as a positive two-wheel drive and a differential gearset lock, the construction being covered with patents. The Wayne chassis was first built in Canada to a design constructed by G. S. Gunder-son of Toronto, who is now serving the United States government as a consulting engineer and is stationed at Dayton, O., supervising tractor construction. The company purposes to manufacture rear axles, wheels and frames as well as the completed chassis, because there is a demand for these exceeding production.

AIRCRAFT DEFENSE TRUCKS FOR COAST CITIES.

Mobile artillery that can be quickly moved and stationed wherever necessity shall require is essential for the protection of cities where there is reason to believe that attack may be made by enemy aircraft, and the United States government has made provision to safeguard different communities and necessary military and naval bases with rapid firing guns that can be trained at practically any angle.

The defensive equipment includes artillery mounted on the decks of heavy power trucks that has accurate range of three miles, and these guns are regarded as the best that ordnance engineering has produced. The accompanying illustration is of one of 17 United States truck chassis on which is mounted a gun unit, recently added to the defenses of the Brooklyn navy yard at New York city.

MICHIGAN RURAL EXPRESS SERVICES.

From Lansing, Mich., rural express routes are operated to Detroit, Flint, Saginaw, Bay City and Battle Creek, and plans are making to extend the route from Battle Creek to Kalamazoo and Coldwater. These services operate one truck or more in each direction daily and have quickly developed business, principally shipments between each terminal.



Aircraft Defense Artillery Mounted on a United States Truck in Coast Protection Service.

Industrial Success of Hoover Steel Ball Co.

The rapid growth and success of the Hoover Steel Ball Co., Ann Arbor, Mich., which today is one of the leading industries of that city and has in a comparatively short period become one of the largest concerns in the world engaged in the production of steel balls, which are used in great numbers for the manu-

company, and they are equipped with every manufacturing facility that will insure production of highest quality. High efficiency is obtained by careful organization and methods, working time and labor being especially conserved, while quality is insured by a rigidly maintained system of inspection. The sales department is equally developed, and the administration of the company has been such that it has established a market for and now supplies more than 30,000,000 steel balls a day of 24 hours, or the stupendous total of 10,950,000,000 annually, measured by the standard of quarter-inch balls. The demand is con-

head, who has not only developed it to its present proportions, but has found time to devote his activities to other business enterprises in which he has had equal success in development and business growth.

Besides serving as president and general manager of the Hoover Steel Ball Co., Mr. Hoover is vice president of the Parker Manufacturing Co., president of the American Plug Co., president of the King Trailer Co., president of the Ever-Tite Nut Corp., director of the Heath Carburetor Co., vice president of the Mulkey Salt Co., president of the Forge Products Co., and he is also financially interested in other concerns and participates actively in their administration. There are few business men who have greater demands upon their time.

When a fatherless lad of six years he began work on a farm in York county, Pennsylvania, and later on attended public school at Cleveland, O. When 13 years of age he found work with the Cleveland Machine Screen Co., where his aptitude and energy and devotion to his work attracted the attention of John J. Grant, recognized as the founder of the American steel ball industry. His resolution to succeed and his undoubted capacity later won his association with the Grant Ball Co., and then he became identified with the Grant-Hoover Co., the Standard Roller Bearing Co. and finally the steel ball department of the Flanders Mfg. Co., leaving the last mentioned to found the Hoover Steel Ball Co.

Mr. Hoover's policy has been to produce steel balls of quality, and claim is made by the company that its product is recognized as the highest grade that can be made. That this is evidenced by the tremendous trade demand for Hoover steel balls.



Leander J. Hoover, President and General Manager, Hoover Steel Ball Co., Ann Arbor, Mich.

facture of bearings, has rarely been equalled industrially. Ball bearings are used in practically all automobile vehicles, but they are utilized in machines of all types where conservation of power through reduction of friction and great endurance are sought. The uses of ball bearings are innumerable, and the sizes are equally varied, there seemingly being no engineering limitations, the only obstacle to practically universal use being the cost.

The Hoover Steel Ball Co. operates a very large plant, the buildings being designed for the specific purposes of the

stantly increasing, and there is reason to believe that it will continue to increase in future in at least the same ratio experienced in the past.

The magnitude of the company's operations has been indicated, but the rapidity of growth can hardly be conceived, for it was established in 1913, and what has been stated has been accomplished in approximately five years, a very short period for such large industrial progression. The success of the company is due principally to the energy and business ability of Leander J. Hoover, organizer of the company and its present

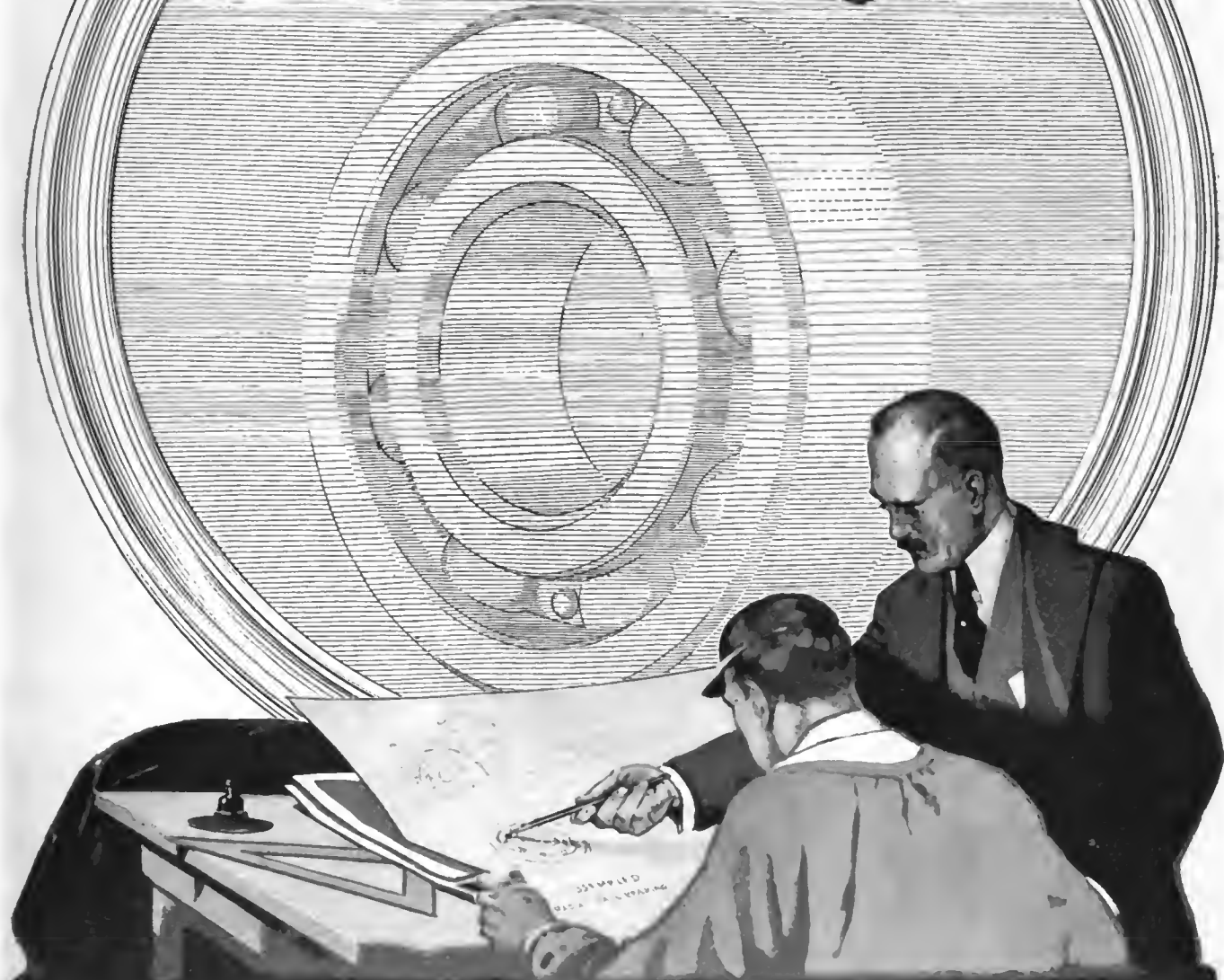
ARMY CONTRACTS FOR 5000 TRUCKS

The Motor Transport Division of the Quartermaster's Department, U. S. A., has made contract for the building of 5000 class AA trucks, these having 1500 pounds load capacity, to the following concerns, six of which have been exclusive producers of passenger vehicles. The class AA truck is the GMC $\frac{3}{4}$ -ton chassis, which design has been adopted with slight modifications, the principal change being in the design of the springs. This succeeded the original class AA chassis, which was a special production. The contracts will be completed by:

Auburn Automobile Co.	.....	Auburn, Ind.
Dort Motor Car Co.	.....	Flint, Mich.
Elgin Motor Car Co.	.....	Chicago, Ill.
General Motors Truck Co.	.....	Pontiac, Mich.
Hupp Motor Car Co.	.....	Detroit, Mich.
Lexington Motor Co.	.....	Connorsville, Ind.
Saxon Motor Car Co.	.....	Detroit, Mich.
Standard Motor Truck Co.	.....	Detroit, Mich.
Moline Motors Co.	.....	Moline, Ill.
J. C. Wilson Co.	.....	Detroit, Mich.

William C. Poertner, one of the best known dealers in cars in New York City, has made contract with the United States Motor Truck Co., Cincinnati, O., to distribute United States trucks in the metropolitan district.

Hess-Bright Ball Bearings



Understand What Bearings Must Do

You regard the strength of axles and shafts as of prime importance. Possibly you leave the matter of bearings to others.

Yet the ball bearings must carry the same load as the axle—must stand the same strain as the shaft.

That's why they are *all* important. If you will insist on Hess-Bright Ball Bearings you will get service. For each is built to stand a certain load—with an excess to spare. Their making guarantees their service and this in turn your satisfaction.

THE HESS-BRIGHT MANUFACTURING COMPANY

Where Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)



E. & S. Power Hack Saw.
E. & S. POWER HACK SAW.

The new E. & S. Power Hack Saw, manufactured by the Ellis-Smith Manufacturing Co., Buffalo, N. Y., is a high speed machine with a sawing capacity of four by four inches. The saw arm takes a nine-inch blade and is driven by a crank working between V bearings and is equipped with a sliding weight to regulate the pressure to secure the best results from the saw blade. It has an automatic stop and is driven by a 10 by two-inch crown pulley, or a crank can be furnished for hand driving.

GRINDING AND BUFFING TOOL.

A machine tool of practical value to the garage and tire repair man is the Johnson Electric Grinding and Buffing Tool, manufactured by the U. S. Electrical Manufacturing Co., Los Angeles, Cal. The machine is operated by a self-contained motor, with all its working parts enclosed in a dirt proof casing. The motor may be had in a number of windings at speeds of either 1800 or 3600 revolutions per minute. For garage work the arbors may be fitted with two grades of emery wheels; for tire vulcanizers, a buffer and grinding wheel. The manufacturers say that the machine is very enduring, smooth, easy running and silent in operation.

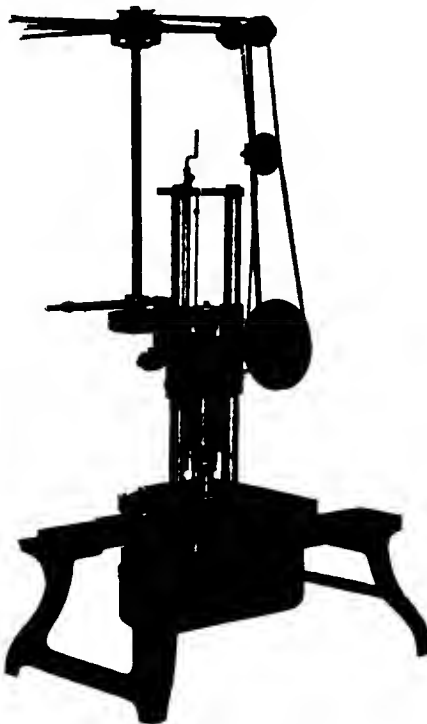


Grinding and Buffing Tool.

CYLINDER GRINDER.

A cylinder grinder is manufactured by the Pennypacker Manufacturing Co., Los Angeles, Cal., with which it is possible to grind holes from two inches to six inches in diameter and up to 18 inches in length. The equipment consists of two spindles for different sized holes and three grinding wheels of different sizes. The grinder has two speeds for grinder wheels, 4500 and 6800 revolutions per minute. The countershaft is equipped with tight and loose pulleys six inches in diameter for three-inch belt and is designed to run 600 revolutions per minute.

This machine has an automatic raising and lowering clutch and micrometer adjustment of grinder can be made instantly at any time. About one-half to one horsepower is required, depending upon the depth of cut taken. The table is 36 inches long by 24 inches wide and 24 inches high. The maker covers the machine with a broad guarantee.



Cylinder Grinder.

SIoux REFACING TOOL.

After a number of grindings to seat valves the seats may be so pitted or warped that new seats must be made. The best repair is complete refacing of the post by cutting or reseating the seat, or both. The Sioux Refacing Tool, manufactured by Albertson & Co., Sioux City, Ia., is designed for refacing valves and is designed for use with any valve of standard type, that is, with 45-degree face up to three inches in diameter.

For valves of 30 or 60-degree faces extra cutters are obtainable. The cutters are made of tool steel, hardened and tempered. The manufacturer claims that no experience is necessary for operating the tool and that finished jobs are obtainable in a surprising short time, even by inexperienced workmen.



Capital Internal Grinder.

CAPITAL INTERNAL GRINDER.

The Capital Internal Grinder, built by the Lansing Stamping and Tool Co., Lansing, Mich., is designed to greatly economize labor in any service station or repair shop. The spindles are fitted with ball bearings, all parts being machined in jigs, sliding parts scraped to surface plates and cylindrical parts fitted by grinding. The stand is a one-piece casting 29½ inches high. The base is bolted to the stand or can be mounted upon a bench and weighs 200 pounds. The table is a single unit, fitting in ways on the top of the base, and is operated by a pinion and rack. The work spindle head is mounted upon a plate fitted to the table and the position of this plate is altered by loosening lock bolts. It can be set to any angle up to 90 degrees. The grinding wheel head is built in two sections. The wheel spindle forms the front and the drive shaft head the rear part. The wheel spindle is designed to run at high speeds. The countershaft is in three sections, drive shaft, intermediate shaft and main shaft. A complete water attachment may be had if so desired.



Sioux Valve Refacing Tool.



ROSS GEARS

Take My Place For Just One Day

"And you'll know, as I do, what it means to drive a truck equipped with a Ross Steering Gear. You can't tell much about it in a few minutes' trial—nor even in an hour or two. It's the long grind, morning to night, day in and day out, that tells the tale.

"I've driven a lot of trucks in my time—most of them good ones, too—well made and with good reputations. Some of them were hard to handle—just a constant strain all day long. Many a time I've gone home so dead tired that I was simply 'all in, down and out'.

"Then there were others so easy to handle that it was a pleasure to run them. There wasn't much difference in general construction, but I soon found that the trucks that were easiest to handle had a Ross Steering Gear. That one thing made all the difference.

"Ross Gears have an unusually big bearing surface so that it is easy to steer the truck under all conditions. This gear is so well made and the material is so good that I always feel better with a Ross Steering Gear. It means safety and reliability, and the work is easier.

"The boss says I am doing more work with this Ross Steered truck—and I know I am—but it's a fact that I don't have to work so hard to do it. I'm satisfied, and since he has given me more money because of the work I am doing, the boss must be satisfied too."

Ross Gears are used as standard equipment by one hundred and fifteen manufacturers, representing considerably over half the motor truck industry. Write for catalog and any special information desired.

ROSS GEAR & TOOL COMPANY
790 Heath Street, Lafayette, Indiana

The Steering Gears
that
PREDOMINATE
on
Motor Trucks

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)



Steel-Framed Wire-Screened Pen Used with Steel Dumping Body for General Purposes by Pennsylvania Farmer.

STEEL TRUCK BODY PEN FOR STOCK HAULAGE.

The type of truck body that will best serve a farmer is of course dependent upon the work that must be done. In any event, what is required is what will be most generally useful. Probably without experience with trucks on farms, the average man would assume that the express, or platform, body would be the most adaptable, but those who have a knowledge of conditions and needs believe that the steel body, with power hoist, will be the most serviceable.

With a maximum capacity body for the chassis, haulage of farm products can be done, for many loads will have large bulk, but comparatively little weight, while fertilizer or soil can be spread. Again, this form of body can be used for other purposes if the owner desires to make outside contracts. An interesting example of utility is the $3\frac{1}{2}$ -ton Federal truck owned by the Beechwood Farms, Sharpeburg, Pa., which is equipped with a steel end-discharging body elevated by a hydraulic hoist.

When live stock or bulky loads are to be carried, a heavy steel-frame wire-screen pen is placed in the body and the freight can be carried with perfect security. This pen can be quickly placed in or removed from the body, and the additional cost is small compared with its utility.

SPECIAL LIVE-STOCK BODY FOR POWER TRUCKS.

Driving live stock from farms to market or for delivery from stock farms to buyers is costly from the fact that in any event the time of men is required, and if the cattle are sold for slaughter there is more or less shrinkage from the work. If the distances are too short for shipping by railroad the alternative is haulage. For vehicle freightage, animals can only be used within a radius of a few miles. Power trucks can be utilized with large economy, especially if there is constant work of this character to be done.

At Pittsford, N. Y., a live-stock dealer who makes frequent deliveries to buyers at Rochester, N. Y., has equipped a Sel-

den $3\frac{1}{2}$ -ton chassis with a special body that has six transverse stalls in which cattle can be carried. They are loaded and unloaded by plank runs on which they are led into and from the stalls. The distance is 14 miles, and the truck is used daily, being made 100 per cent. productive by return loads.

TOWER TRUCK LOAD RATING.

In the July issue of *MOTOR TRUCK* an article descriptive of the single model truck built by the Tower Motor Truck Co., Greenville, Mich., which has a load rating of two tons, through error stated the rating to be $2\frac{1}{2}$ tons. The facts presented in every other detail were correct, this applying to the construction units, dimensions, details of design and special features and processes of production and assembly.

The American Motor Truck Co., Newark, O., builder of Blair trucks, has elected Col. Joseph D. Potter president.

The Interstate Motor Co., Muncie, Ind., is now working to capacity producing tractors to meet a government order.

LALLY TRUCK DUMP BODIES.

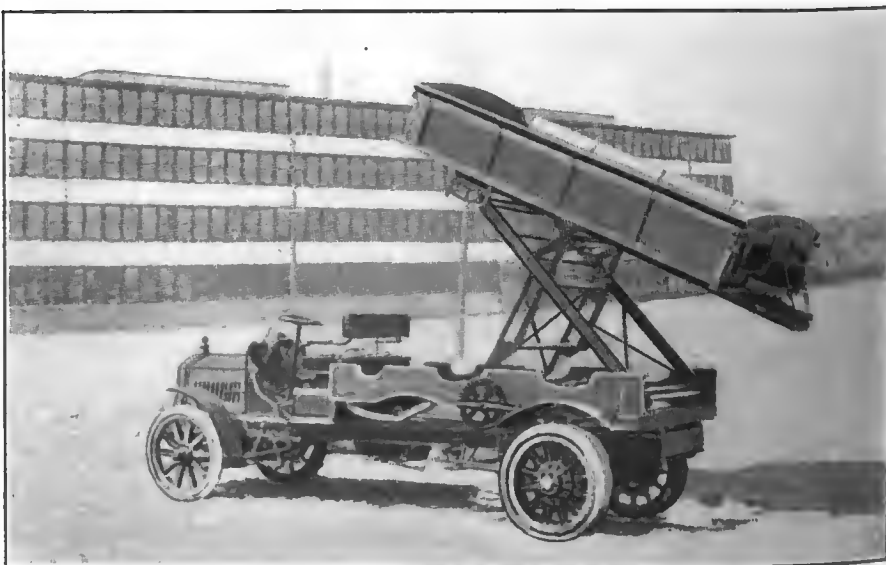
The Lally Commercial Body Co., Inc., successor to Patrick Lally & Sons, Everett, Mass., specializes in the manufacture of power truck bodies adapted for quick discharge and varying types of body hoists. The concern was established in 1847 and incorporated in 1911, originally engaging in wagon building, and it has kept pace with the demands for bodies of all descriptions that can be utilized with power vehicles, either trucks or converted chassis.

The hoists are either manually or power elevated, the former class including a single vertical screw mechanism that was perfected several years ago, and various mechanisms for elevating the front ends only or elevating and inclining the bodies so that they can discharge through chutes to pockets or bins some distance from the trucks.

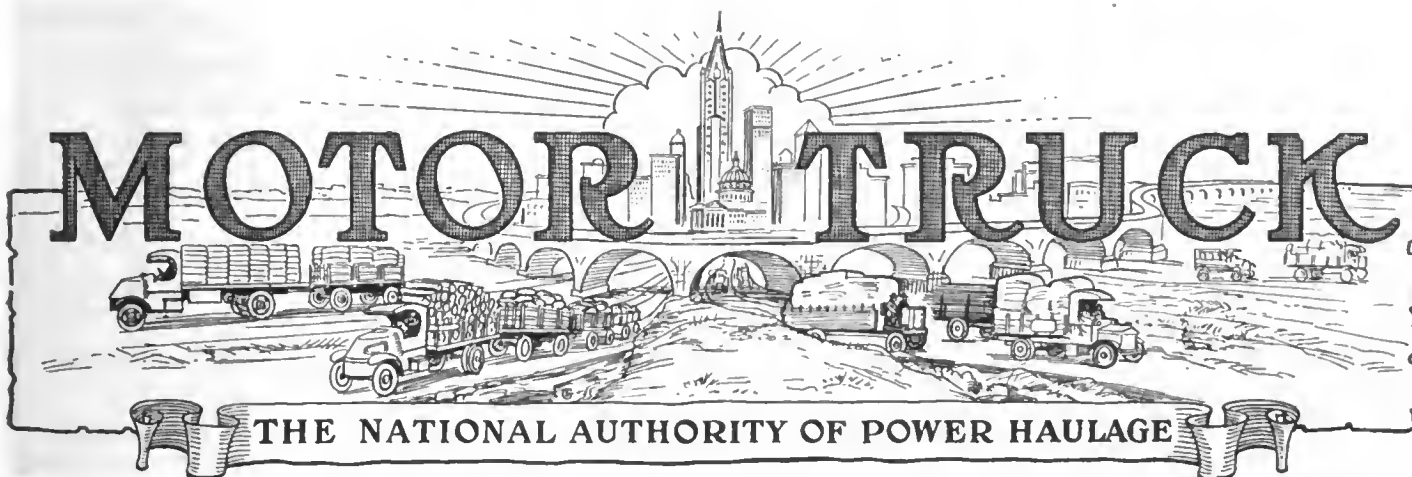
The different hoists are covered with patents and have been used by a very large number of concerns, many of which operate in eastern New England. These are supplied only with Lally bodies. One that is especially useful is a turntable type with which the load can be discharged either at the rear or the side as desired. One type that has been used with much satisfaction is the "Metropolitan," which is shown in an accompanying illustration.

The dumping bodies for trucks and trailers are adapted for practically all purposes where bulk loads are handled and for hauling coal, sand, gravel, concrete, slag, asphalt, stone or earth. When required, platform bodies are built for elevating. These are built to specification only and cannot be supplied from stock. The company is prepared to submit estimates for any equipment and will furnish any desired information at request.

The profits of the Pierce-Arrow Motor Car Co. for the three months ending June 30 were \$1,523,421, as compared with \$1,303,376 for the same period in 1917.



Packard Truck Equipped with a Lally Metropolitan Hoist Two-Ton Capacity Body Built for Coal Delivery.



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PAWTUCKET, R. I.

SEPTEMBER, 1918

RECORD-MAKING HAULAGE PLAN

How the Thayer-Griffith Co. Organized Workers, Adapted Equipment and Utilized Trucks for Practically Continuous Operation for Many Months at Victory Plant at Squantum, Mass.

ENGINEERS, especially those engaged in work of large magnitude, understand that the same certain and accurate scientific methods they apply to construction can be applied by those who are experts in vehicular haulage. The engineer, undertaking a project, makes a careful survey, and having determined fundamental facts, decides what materials had best be used. This done, dimensions and forms, dependent upon conditions and cost, are fixed upon, and then details are worked out and plans made on paper, from which the builders or contractors do the actual construction.

In theory, at least, each work is mentally completed and such notes as are necessary are made, so that each worker can be guided, and much actual constructing can be done at a distance. To be specific, the engineer plans with the knowledge that because of recognized standards for dimensions, forms and materials and methods that are known as practical a work of any proportions can be done as perfectly

as may be desired. The contractor, with these engineering standards, and knowledge of materials and construction work, can determine quite as accurately in theory the cost.

With the engineer and the contractor details are of great importance. Each item must be considered in its relation to the others and nothing can be neglected. Any omission might be corrected, but the consequences might be delay or expense. One of the advantages of engineering methods is that the cost can be estimated closely. With normal conditions of industry and minimum fluctuations of prices the estimate may be computed precisely.

Value of Operating Data.

In all large works transportation of materials and necessary haulage is a considerable part of the expense, and engineers have been forced to recognize the knowledge of those engaged in such work in making estimates and determining cost. Obviously the haulage contractor who does not have standards by which he can determine prices for proposals



Part of the Old Aviation Field at Squantum, Mass., Now the Site of the Destroyer Plant of the Fore River Division of the Bethlehem Shipbuilding Corporation, Before the Yard Construction Was Begun. (C) International Film Service.

THAYER-GRIFFITH VEHICLE EQUIPMENT

When Contract Was Begun Oct. 7, 1917.

Number of units, 48.
Size of units, five-ton.
Make of units, Pierce-Arrow.
Body equipment, steel dump with hydraulic hoist.
Vehicles increased to 82.
Size of units, 78 five-ton, four two-ton.
Body equipment, 70 dump bodies, 12 platform bodies.
Maximum number of trucks worked, about 100.
Excess required over equipment hired as needed.

made cannot compete with those who can. There is nothing mysterious of accounting. Its value as applied to business generally is understood the world over, and there is no probability of loss if prices are established on the basis of a reasonable profit above operating expense.

There is reason to believe that a concern well organized

Fore River plant of the same concern. That the reader shall understand fully the conditions the need of the nation may be recalled.

We are at war with Germany. The United States wanted additional torpedo boat destroyers which are the type of vessel most necessary to combat submarine vessels and protect the convoys of troop and supply ships sent to France

and elsewhere. These could only be obtained by building and every shipyard was rushed to the limitation of its facilities. The Bethlehem corporation was willing to build destroyers, but it had no yard. The alternative was to build and equip a plant, and this was decided on, the location being close to the Fore River works at Quincy, Mass.

Necessity of Quick Haulage.

The engineer for the work was Monks & Johnson of Boston, the main contractor was the Aberthaw Construction Co. of Boston, and after the plan had been determined and the contract made the Aberthaw company sought a haulage specialist to make contract for the transportation of all materials necessary for construction and filling the ground to the level at which all the buildings were to be built. The site was in part a tract of land formerly used by a school for aviators, and a part of it was a marsh along the shore of Quincy bay and a "flat" that was partially submerged at high tide.

The site of the yard was all low and the estimate of the engineer was that 1,250,000 cubic yards of filling would raise the surface to a level that would be reasonably dry and practical for shipbuilding. To expedite the filling and to have sufficient depth of water for launchings the engineer planned to pump mud, sand and silt from the flat below the low water mark to fill the land to an approximate height, and to cover this with sand, gravel and crushed stone.

The plan necessitated the haulage of all building material and the filling, and there was not even a cart path on the site. The estimate of dry filling was approximately 320,000 cubic yards and the nearest source of crushed stone available was Boston, while sand and gravel could be obtained at a

HAULAGE CONTRACT.

Moved about 200,000 cubic yards of dry fill, sand, gravel and clay.
Round trip to Montclair, about six miles.
Time of round trip, about 60 minutes.
Average load, four cubic yards.
Loading facilities, five steam shovels.
Unloading, dumped at specified places.
Roads built, miles, six.
Filling spread from 18 to 24 inches deep over surface of yard.
Filling at building sites, roads, etc., four to eight feet.

and systematized will be efficient in its undertakings, and that it will be prepared to undertake work with certainty of success. The engineer will be more inclined to make contract with a concern that can be depended upon to carry out the work rather than take chances with one that is less dependable. The larger the work the greater the need of dependability and responsibility. When the work is emergent expense may be secondary and larger prices obtained than are commanded for similar works undertaken in less urgent conditions. The ratio of value established for service may be very large and yet be extremely reasonable considering the needs and the conditions.

Record of Time and Labor.

Scientific contract haulage is not generally engaged in. The majority of contractors operate without definite knowledge of operating cost. This does not mean that accounts are not kept, for in a general way concerns of proportions have sufficient information of revenue and expense to learn accurately whether or not a profit is realized, but they do not account for time and labor to the same extent that these are accounted for by industrial operators.

There is no work in which there is greater need of precise facts than haulage contracting, because there are so many possibilities of loss, and every minute of time of vehicles or men that cannot be utilized and which must be paid for is lost beyond recovery. Both labor and machines have a reasonable degree of productivity that depends upon the knowledge of the supervisor and the manner of operating.

The possibilities from expert vehicle transportation were never so well demonstrated as in the construction of the Victory plant of the Bethlehem Shipbuilding Corporation, Ltd., at Squantum, Mass., which is in reality an addition to the



The Thayer-Griffith Co., Operated Upward of 100 Trucks, Some of These Rented, During the Construction Work at Squantum. This Illustration Is a Part of Its Fleet at the Garage at 460 Albany Street, Boston, Mass.



Five Steam Shovels, Each with a Three-Quarters Yard Bucket, Were Operated at the Gravel and Clay Pit at Montclair, Excavating Filling Material and Loading the Trucks.

nearby bank and at Montclair. Some of the dry filling could be handled by the railroad track that was to be built into the yard, but that part of the work could not be done until the construction had considerably advanced.

Organization and Methods.

The purpose of this article is to show the organization and methods necessary for handling a really big contract for transportation, although secondary to the main work. The Aberthaw Construction Co. wanted speed first of all, and it had to make a sub-contract with a concern that had equipment sufficient to meet any demand upon it. There are hundreds of haulage contractors in New England, but the only one that was large enough in point of having vehicle units available to justify a contract was the Thayer-Griffith Co. of Boston.

At the time of the conference relative to the contract the company had in service about 48 five-ton Pierce-Arrow trucks, which were nearly all equipped with steel dumping bodies and hydraulic hoists, and it had orders placed for rapid delivery of an additional series of machines that insured that it would be able to meet practically any demands that might be made upon it for service. The construction plan was to work practically all the equipment of the Thayer-Griffith Co. to maximum.

Work Was to Be Continuous.

Once the work was started it was to continue without cessation, day and night, Sundays and holidays, without re-

gard to weather conditions, the only purpose being to work the largest force of men that could be utilized advantageously and whatever equipment was necessary to obtain maximum efficiency and the fastest construction that was practically possible.

A better understanding of what was done with the trucks than can be realized from figures expressing tonnage and cubic yards may be gained from the statement that the actual service time of the machines was 154 hours a week against 60 hours ordinarily worked, and that each driver worked overtime 17 hours a week. In other words each truck was worked each seven days the equivalent of a period of 17 days and four hours (including two Sundays) of normal work. One can understand that the use made of the trucks was a very large economy, because approximately half the number was required that would have been necessary if operated but 10 hours a day.

There was, of course, more than double the normal wear, and that the equipment should not deteriorate there was need of constant attention, so that adjustments and repairs would be made without delay. This was imperative from the viewpoint of the Thayer-Griffith Co., which wanted to complete the work with minimum depreciation, and it was essential to the Aberthaw company that every truck required be available upon order.

To meet the requirements of the Aberthaw company for the progress of the construction would depend entirely upon the transportation, careful plans were necessary by the

WORK FOR TRUCKS.

Hours worked a day, 22.
Two 30-minute periods for lunch.
Two 30-minute periods for oiling, greasing, filling tanks, adjustments and minor repairs.
Work continuous, Sundays, nights and holidays.
Initial work equal to 52.8 trucks worked 10 hours a day.
Thayer-Griffith maximum equipment equal to 180.4 trucks worked 10 hours a day.
Peak number of units equal to 220 trucks worked 10 hours a day.
Truck use in seven days equals normal work for 17 days, four hours, including Sundays.
Peak demand ended in February, 1918, and work continued with day men only.



These Five-Ton Pierce-Arrow Trucks Were Operated 22 Hours a Day for More Than Four Months, with Two Shifts of Drivers, Seven Full Days a Week, the Average Load Being Four Cubic Yards.

OTHER HAULAGE WORK.

Material drawn from Boston and other points, including lumber, cement, iron pipe, cement pipe, structural steel, hardware, roofing, piles.

Work done at order to meet construction needs. Orders variable and not regular, depending on progress of work and shipments.

Thayer-Griffith company. The main garage of the company is at 460 Albany street, Boston, with a smaller garage at 24 East Concord street, and usually all the machines are operated from these two bases from the office at the main garage, unless the work is at a considerable distance.

The Squantum yard is approximately 10 miles from the Albany street garage, and were the machines to be worked 10 hours a day going to and from the work would be out of the question but as the intention was to work the trucks as nearly continuously as possible there was seemingly little need of a garage. There was every reason to need repair facilities, however, for repairs and adjustments were to be expected, especially in rough haulage and in winter weather.

Special Operating Plan for Work.

The Thayer-Griffith company operating plan was developed by President Boylan and Treasurer Griffith. This comprehended the personal supervision of President Boylan during the days, with Superintendent Boylan overseeing the

pump to facilitate record keeping. The office of the company was established in a nearby building. The garage force consisted of a day foreman, in charge; a night foreman and two shifts of mechanics, normally of five men each. In the event of need this could be supplemented by additional men.

At the main garage, from which some of the Squantum mechanical force was transferred, the regular repair system was continued. The company has standardized its vehicle equipment with five-ton Pierce-Arrow units, and it has two complete power plants as spares, removing any one that may be defective and replacing it with one that was known to be in good operating condition, so that there should be the least possible delay.

Spare Engines and Wheels.

For obvious reasons the original engine of a truck is not usually replaced, as the extra units are equally good, and after a power plant has been removed for repair or overhaul and it is restored to normal operative condition, to remove the spare and install the repaired engine would be an unnecessary work and expense. No good purpose would be served aside from simplifying the record of the engines, which must be kept with the original chassis until taken out, and after that continued with perhaps other chassis.

Besides the engines the company has four spare front wheels and four spare rear wheels, which are used to replace others removed temporarily for installing new or repairing old tires. With these the only delay is that required for changing wheels, which can be done quickly by experienced men. The company has at its main garage a shop with machine and hand tools adapted for any repair that could be made at a service station, including grinders, shapers, lathes, drill presses, drills, a blacksmithing equipment and other facilities, and the mechanics in charge of a day foreman were expected to do any work, except overhauls, as rapidly as possible.

The company has a stock room in which are series of parts of all kinds that might be needed for replacement, so that these would be available instantly when required, and as the parts are used the stock is replenished so that there is always approximately a standard number on hand. There are also in reserve full units, such as carburetors, magnetos, radiators. The company has a woodworking shop, where it builds its wooden bodies and does all wood repair work necessary on its trucks, as well as painting, only upholstery being sent to outside shops.

With reference to tire repairs and changes, these are practically provided for by the spare wheels, wheels requiring new tires being sent to service stations for replacement. As the company can use any of its trucks for handling wheels and is not dependent upon others for sending them to and bringing them from shops, and there are a number of stations equipped for handling truck tires, there is no reason for consequential delays.

Work Begun with 50 Trucks.

The work was begun with approximately 50 trucks and about 110 drivers, the men being divided into day and night

WORK FOR DRIVERS.

Day and night shifts, Sundays and holidays, 11 hours each.

Maximum number Thayer-Griffith men to shift, 82.
Maximum number Thayer-Griffith men working a day, 164.

Maximum number truck drivers for day's work, about 200.

Day's time for drivers, going to and from yard and driving, from 12 to 15 hours.

Men taken from and to Boston by special truck service.

Men worked two and three shifts without relief.



A Pair of the Thayer-Griffith Trucks Used in a Road Construction Work Near Revere, Mass., Loading with a Steam Shovel at Orient Heights.

night work. This meant that the other operations of the company were subordinated to whatever could be undertaken after meeting the orders of the Aberthaw company.

After beginning the work the Aberthaw company was to give an order each afternoon as nearly 2 o'clock as possible for the number of trucks that would be needed the following day, each day to be started at 7 in the morning. This was allowing sufficient time to make the trucks ready and to notify the drivers, or, in the event of need, to obtain drivers. The charge for service was based on a day, and for that reason there was not as a rule orders given that required less than a full day.

Trucks Maintained at Squantum.

In submitting the work for contract the construction plan was outlined to the Thayer-Griffith company and the different operations were decided on. In making its preparations the company first provided for maintenance of the trucks at Squantum so that they need not be sent to Boston save for major repairs. There was expectation of adjustment and minor repair, which could be in very large part dealt with by the company's mechanical force.

A portable garage that had capacity for six trucks was procured and erected at Squantum. This was connected with electric lighting and power circuits and equipped with benches and all desirable hand tools, and a stock of such parts as might be required was obtained. The garage was provided with stoves for heating and an 1100-gallon gasoline tank was located near the garage, this having a measuring

crews, beginning work at 7 in the morning and working until 6:30 in the evening with a half hour for lunch at 12, and the same hours during the night. This gave 22 hours of actual labor, two lunch periods of 30 minutes each, and two periods between 6:30 and 7 morning and evening when the trucks were oiled, greased, the fuel, oil and water tanks replenished, and inspections, adjustments and minor repairs were made.

When the trucks were sent to Squantum they were not sent back to the main garage unless repairs were necessary, and so the drivers reported to the foremen at the office, they being required to give all the notice possible of inability to work. The men who lived within reasonable distance of

MAINTENANCE OF TRUCKS.

Portable garage at Squantum.
Shop equipped for repairs and adjustments.
Fuel tank of 1100 gallons capacity.
Day and night shifts of foreman and five mechanics.
Repair shop facilities at Boston garage for major repairs and overhauling.
Two spare engines.
Eight spare wheels.
Full stock of parts.

Squantum went there direct. There were no trains or trolleys operating close to the yard and the men had to arrange to reach their work on time. Those living in Boston made report to the office of the main garage.

How the Drivers Reached the Work.

Each yard foreman began to make up his crew about 2 o'clock in the afternoon or the morning. With knowledge of the men available from reports required of the men as they reported out to go home and information received after that time, the foremen notified the main office that a certain number of drivers would be needed as substitutes. With the foremen's reports the main office notified other men to come to the main garage office, and at 5:30 each morning and afternoon a two-ton truck, fitted with seats, was driven from Boston to Squantum, a distance of 10 miles, carrying the truck drivers for the next shift. This truck waited until the drivers of the shift going off duty had been assembled and returned with them to Boston. This long drive was a considerable hardship for the men because of the time required, from 13 to even 15 hours being necessary for them to go to Squantum, do their work and return home. Of course they had to be well paid.

The company's regular force of drivers was supplemented by others, and while drivers could be obtained, they were not always men who would have been chosen for their intelligence and skill. Their work necessitated extremely careful oversight. As the work was every day and night substitutes were necessary in larger numbers than would ordinarily be expected. As the work progressed the weather became very cold and at times the temperature was 20 degrees below. The men suffered keenly with frost bites and the hands and feet of some were frozen, not being permanently disabled, but preventing them working for varying periods. According to President Boylan the drivers who could do the work had to be in the best of health and take good care of themselves.

Men Worked Long Hours.

There were times when the crews were short and volunteers were called to work the next shifts, and in quite a number of instances drivers worked three periods of 11 hours each without rest. Had not the drivers been willing to endure the hardships and to work in conditions that would have been impossible with the average truck man the progress of the yard construction would have been materially delayed. There is hardly need of pointing out that the work was done during an autumn and winter almost unprecedented for the severity of the cold. Only by the most careful organization and keeping oversight over its men was the company able to have the required number of trucks at work.

Accounting for the time of the men and the trucks was done very accurately. A time clock was placed in the company's office. Men reporting at the yard for work stamped a time card at the Aberthaw office and this was again stamped at the Thayer-Griffith office. The men leaving fol-

lowed the same system, so that each time card was twice stamped. This verified every pay roll entry and every bill submitted, obviated the possibility of error or confusion and completed the record for both companies.

Trucks Checked at Gates.

The trucks entered and left the yard at gates where checkers were stationed, who recorded the time of leaving and the time of return, and the character of the load, so that there was accurate knowledge of the time and the work done by each truck unit and driver. One or more inspectors were on duty in light cars on the roads where the trucks were driven outside of the yard to deal with failures that caused delay and to note whether or not the drivers were working to orders. At the steam shovels at the gravel and sand pits checkers were stationed who recorded the time of arrival and departure of each truck and the load carried. So far as possible every oversight that would afford practical results was maintained.

The trucks owned by the company were numbered from 1 to 100 inclusive, so that this series would indicate its own machines without question, and the rented vehicles were each grouped in series above 100, as John Smith's seven trucks were numbered from 121 to 127 inclusive, for instance, and each other owner was similarly identified and there could be no confusion of the records of work.

Drivers Made Day Reports.

Each truck driver was furnished with the regular report card of the company, this giving all essential details of the work done, showing the time of leaving the garage, the places of loading, the character of the loads, the time of loading and departure, the time of delivery and the time of return to the yard, with a record of the mileage, the fuel and oil consumed, the time of delays, the causes of delay and information of accidents. Each driver also made report on the condition of the truck mechanically, and the foreman in charge determined from inspection what had best be done to make repair or adjustment.

On the road outside of the yard the drivers made report to the foremen by telephone in the event of failure or damage and other machines or a car with a mechanic or two with tools and parts was sent out to make restoration, at least so that any inoperative truck could be moved to Squantum or Boston, where it could be worked on quickly and conveniently.

The working conditions were hard as a whole. The marsh was soft until it was filled or frozen. The surfaces at the sand and gravel pits were soft until freezing weather. In the Squantum yard the filling was first soft and later very rough. The worst condition that was experienced was before the marsh was frozen and when the filling was done from the roads that had been made across it. The roads were planked and were fairly good, but if a truck were driven into the mud it could not be extricated by its own

TRANSPORTATION PLANS.

All orders for haulage sent to transportation office by departments.
All orders issued by office to Thayer-Griffith Co.
All trucks leaving or arriving checked at yard gates.
All loads checked at sand pit.
Order of loading at sand pit specified by loading director.
Inspectors on road checked trucks to prevent delays.
Men's time double checked by time clocks.

power. The only certain manner of placing it on the road was towing with another truck that had traction. After several trucks had been mired the drivers became very careful, for working about a machine stalled in mud was anything but pleasant.

All the trucks were equipped with sections of chains with hooks at either end, which were placed at four different places, 90 degrees apart, on the tires, being secured to spokes. These were found to give very good satisfaction so far as affording traction on wet or icy roads, and they did not wear the tires to any material degree. The one thing that was necessary was to impress upon drivers the need of

using them and only constant attention insured the use of chains.

Trucks Were Not Overloaded.

While the trucks were worked hard they were not overloaded, which was a very wise precaution considering the conditions for use. All of the dump trucks have steel bodies of six cubic yards capacity, but as a rule four yards was accepted as a load, which insured against stresses and mechanical deterioration on rough roadways, and materially reduced the fuel consumption. Security against overloading was believed the best insurance of service and that the company had its trucks operating with a very small percentage of lost time seemingly establishes this policy as desirable where continuous work is necessary.

Had truck transportation been delayed or a shortage of machines experienced from failures there would have been general retardation. As a matter of fact so efficient was the haulage operations that the work on the yard was done eight times faster than would have been regarded as satisfactory in normal industrial conditions.

What has been stated is for the purpose of showing that work of large proportions must be coordinated with other engineering; that there must be system and organization; that careful record must be kept; that only by continuous supervision can work be kept to a definite standard of results.

All Dump Trucks at First.

The company started the contract with approximately 50 trucks, all of them equipped with steel dumping bodies. The dumping trucks were used for filling and later on the platform trucks were utilized for hauling lumber, steel, pipe, cement and other materials. Haulage was begun early in October. The first work was building a road across the marsh, which was overflowed at high tide. This necessitated a fill in a straight line for a half mile to the site of the plate and angle shop, from five to six feet in depth, the filling being gravel and made a corduroy with plank.

At the shore line of the yard dikes or banks were built by hand labor to keep the water from the marsh, the material being taken from the flats. When these were built suction dredges drew sand and mud from the harbor and pumped these materials back of the dikes, there being something like 930,000 cubic yards of this filling. As the water seeped from the mud and it became dry the surface was covered with sand and gravel from 18 to 24 inches deep, and there were other places where there was exclusively dry fill from four to six feet. There was more or less crushed stone used for cement and foundations, and in some instances for filling. The rock was delivered by stone contractors from Boston, the haul ranging from seven to 14 miles and averaging nine miles. There was very little stone haulage done by the Thayer-Griffith Co.

Round Trips About an Hour.

The sand pit was a distance of a mile, this making two miles to the trip, and the gravel and clay was obtained at Montclair, a haul of about six miles for the round trip. The conditions were such that a round trip to Montclair took approximately an hour, despite all endeavors to hasten the work, largely because of the roughness and grades at the pit, while the delivery had to be made wherever there was necessity of making the surface of the yard level.

After the building of the first road across the marsh other lateral roads were constructed with gravel and plank, and when the site for the plate and angle shop was reached by the road this was filled. The construction of the shops was begun as soon as the flats were free from water, the foundations being placed and piers erected on them. The buildings were built and very often practically completed before the filling was done. The trucks were driven into the structure and the floors brought up to the tops of the piers. Handling trucks in such conditions necessitated careful and exact work and there was some retardation as compared with places where the dumping could be without particular reference to location. The work was carried on day and night, lighting circuits being put in to insure against interruption.

Steam Shovels Loaded Trucks.

The Aberthaw company located five large steam shovels at the gravel pit and these were so placed that there would be no unnecessary delay of the trucks, although loading was slower than had it been done by gravity from hoppers. Truck

directors were stationed at the pit, one with each shift, whose duty it was to observe conditions at each shovel and assign each truck as it arrived at the pit to the shovel that could best load it. This was done to avoid any possibility of confusion or misunderstanding and to insure that the machines were kept on as nearly a uniform headway as was possible. The truck drivers had no choice and the directors were responsible for conditions that might result in delay. When the weather became cold steam curtains—heavy canvas sheets—were suspended over the bank, and the spaces back of these heated by steam to prevent the gravel and clay freezing, and despite the low temperature this protection was such that the steam shovels could work constantly.

The cold, however, made necessary extreme care to protect the trucks. There were periods when the cooling systems and radiators froze, considerable trouble being experienced from the pumps freezing and the pins shearing. At first alcohol was used in the radiators, but there was considerable loss of alcohol from evaporation and the drivers were disposed to be careless, believing freezing impossible. The men were then ordered to drain the engines whenever stopped, and finally water instead of a mixture was found to give quite as good results. The reason for this was that with the engines drained there was no possibility of freezing, or if the system had begun to freeze while running trying the drain cocks led to work that insured against damage.

Replenishments Between Shifts.

When the trucks came into the yard at the end of the day or night shift they stood idle for whatever time remained until 7 o'clock and work was begun promptly at that time. As much filling of tanks with oil, fuel and water as was possible was done before 7 o'clock, but those that had gasoline, lubricant or water sufficient to make a trip or two were sent out and the replenishments were made after the next succeeding trip, the purpose being to have no delays, maintain the necessary headway and prevent congestion at the garage where the supplies were given. The oiling and greasing of the moving units aside from the engine was done by the mechanics attached to the garage, so that this was systematically given attention and there was no possibility of error.

As the work progressed the trucks gradually worked over increased area as the filling was done, and the principal grading was finished in February, so that during practically all of the cold period the work went along without cessation. When the work was at peak the Thayer-Griffith Co. had upwards of 90 trucks, each working 22 hours a day, besides those that it rented in addition. After the greater part of the contract was completed the trucks were worked the conventional 10 hours, from 7 in the morning until 6 at night, with an hour for lunch. The system of operating was continued unchanged, the drivers being taken to Squantum each morning and brought back each night.

Service Led to Other Work.

After the work for the dump trucks had been practically completed the platform trucks were used to haul material of all kinds and they were used in varying numbers. Even today the company does considerable haulage to Squantum, although the contract has been completed. The service afforded in the contract work for construction has established a prestige with the different departments of the United States government, so that much of the work required by them is done by the company. In fact a considerable part of the haulage now done is for different divisions of the service. For instance, it handles all of the coal deliveries for the Navy Department, and it has a contract in connection with the construction of the new emharkation pier at Boston.

Besides this the company now has a contract for haulage of the fill in the construction of the new Holy Cross cemetery at Malden, this being the movement of approximately 40,000 cubic yards of material, very largely sand and gravel, from a hill at Maplewood, about 1½ miles away. Five trucks are doing this haulage, working with a steam shovel, and they are moving 500 cubic yards daily when the weather will permit, because the ground is soft and the machines cannot be worked economically in loose earth.

The company now has a fleet of 82 trucks, four of which are two-ton capacity and the others are five-ton units. All but 12 are equipped with steel dumping bodies and hydraulic hoists, which is probably the largest fleet of trucks operated

by any haulage contracting concern in America. The system that was originated by this concern has been described in previous articles. Suffice it to say that the business of the company has been developed in less than three and a half years from a single used truck, and the secret of its success is largely the knowledge of costs and utilizing the time of the machines and men to make a profit. Besides its own

trucks the company frequently has demands upon it that necessitate hiring others. At times it has fleets operating in different sections of New England, and when the information for this article was obtained there were contracts under way at Springfield, Mass., and New London, Conn., to say nothing of numerous other work within a score of miles of Boston, there being demand for all its equipment.

GUY B. WRIGHT JOINS BUDA CO.'S SALES FORCE.

The sales organization of the Buda Co., Harvey, Ill., builder of Buda trucks and tractor engines, has been augmented by the services of Guy B. Wright, who has been since the autumn of 1916 western manager of sales of the Stewart-



Guy B. Wright, Formerly with the Stewart-Warner Corporation, Now with the Buda Co.

Warner Corporation, manufacturer of speedometers and other specialties, and who previous to that was connected with the Vacuum Oil Co. in various capacities for 14 years, being in charge of the sales of motor vehicle lubricants department when he went to the Stewart-Warner Co.

Statement is made by the Buda Co. that the outlook of the company as a factor in the automotive industry is broad and that its policy is building for the future in developing its sales organization, although the very largely increased demand for Buda engines would appear to preclude much selling activity. The object of the company is to have its sales force cooperate intensively with Buda owners and prospective buyers to establish the prestige of Buda products and to become recognized from every aspect that appeals to the buyer who seeks quality and dependability.

To train 1500 soldiers at the University of Tennessee the rudiments of motor truck maintenance and upkeep, as well as driving, the dealers and garages of Knoxville, Tenn., released mechanics and drivers to meet the requirements of the government for an eight weeks' period of instruction.

NEW SANFORD CATALOGUE.

The Sanford Motor Truck Co., Syracuse, N. Y., has just issued a new catalogue that is decidedly the best literature that has ever been produced by this concern. The booklet is handsomely designed, admirably illustrated by cuts and sketches printed on fine paper and is exceptionally well bound. Besides brief description of the different construction units and construction detail of Sanford trucks pertinent to the illustrations, it presents abridged specifications of models W-25, W-35 and W-50, the 2½, 3½ and five-ton chassis, as well as a two-page illustration of a plan view on which is indicated the various "time tested standardized parts" that are used in Sanford trucks.

The catalogue further presents some body types that are adaptable to the different sizes of chassis, and also shows a number of fleets of Sanford trucks now in use. There is in addition some extremely interesting information relative to Sanford trucks. Incidentally, all Sanford trucks have the standard warranty of the National Automobile Chamber of Commerce.

GEAR MANUFACTURERS MEET.

The semi-annual meeting of the American Gear Manufacturers' Association was held at the Hotel Onondaga, Syracuse, N. Y., Sept. 19, 20 and 21, and was well attended. The programme included the presentation of several papers and a number of addresses on industrial and trade subjects, besides discussion of propositions of different characters. Among the addresses made were those on "Priority," by Charles A. Otis of the Priority Committee; "What Is the Possibility of Women Becoming a Permanent Factor in the Gear Industry," by W. H. Diefendorf; "Trade Acceptances," by C. F. Crofoot, and "The Outlook of the Steel Supply," by C. E. Stuart, secretary and treasurer of the Central Steel Co., Massillon, O.

NEW ACASON TRUCK AGENTS.

Vice President and Director of Sales Harry A. Conolon of the Acason Motor Truck Co., Detroit, announces that the following have made contract as agents for the sale of Acason trucks:

Dixie Motor Sales Co., Memphis, Tenn.; Harper Bros., Hackensack, N. J.; Henderson Motor and Supply Co., Grand Rapids, Mich.; Redwine Bros. Motor Co., Spiro, Okla., and Ft. Smith, Ark.; Hawkins-Russell Motor Co., Atlanta, Ga.; W. H. Gibbons, St. Thomas, Ontario, Can.; Bonner-Acason Co., Norfolk, Va.; Ohio Oldsmobile Co., Cleveland, O.; Sloan Motor Co., Greensboro, N. C.

Harris Manager of Republic Truck Co.'s Sales

H. F. Harris is announced by the Republic Motor Truck Co., Alma, Mich., as general sales manager of that company, and statement is made that he is widely known, has been connected with the industry for years and has a very broad experience covering manufacturing, advertising, sales, industrial engineering and works management. He has, of course, a wide knowledge of the trade and is qualified to carry on the distribution of Republic trucks. The company claims to be the largest manufacturer of power vehicles in the world and to have the most extensive sales organization.

Coincident with this announcement is the statement that Lafayette Markle, for a considerable period vice president and assistant general sales manager of the Republic company, has resigned that connection and will in future devote himself actively to the operations of the L. Markle Co. and the Chicago-Republic Truck Co., both of which he largely controls. When Mr. Markle joined the Republic organization he retained his interests in these companies and as they have



Lafayette Markle, Former Assistant General Sales Manager, Republic Motor Truck Co.

increased in importance he must concentrate his endeavors upon them.

V. C. Fuller has been made special traveling representative of the Bearings Service Co., Detroit, and attached to the main office in that city. He will visit the company's distributors. Mr. Fuller was formerly with the Dictaphone Co.

Servis Recorder's Chart Shows All Truck Moves

A time recording device for power trucks, just developed, which is entirely new in its principle of operation and is claimed to be proven for accuracy and certainty of record, has been perfected by the Servis Recorder Co., Cleveland. It is a development from the time and distance recording instruments produced by this concern, some of which have been in use for several years.

The device is known as a Servis Recorder and it is not connected with any

merely carried aboard the truck.

In operation it is actuated by the side sway, which is always created when any vehicle is in motion—even in a Pullman car running on smooth tracks. The side sway causes a pendulum to oscillate and the pendulum is fitted with a steel stylus or marker which marks a travel path on a waxed chart that revolves once every 24 hours. In simple terms, therefore, the Servis Recorder is a clock which turns a chart and a pendulum (not connected with the clock, but separate from it), which by means of a steel point marks a travel path upon the chart.

After the day's run the chart is taken by the owner, superintendent, traffic manager, dispatcher, or whoever has charge of trucks, and he, by comparing the chart with the trips for the day can see, as shown in the example below, just

where to begin to cut down the idle time and to increase the productive time of the truck. A simple totaling device is furnished, which quickly totals from the chart the exact running and standing time for the whole or any part of the day.

Another feature emphasizing the simplicity of the new Servis Recorder is the fact that it requires practically no attention. It has no pencil or pen to renew or adjust and not even a clock winding key to bother with. It is merely necessary to change the charts daily and wind. Not only is it fool proof, but it is tamper proof as well, for the working parts are completely enclosed in a strong metal case and padlocked.

It is believed that in eliminating all attachments to the running parts of the

truck, such as gears, rods, shafts, etc., the big obstacle to the success of time recording devices for motor trucks has been overcome. The present instrument is simpler in many ways than a speedometer and the information it gives is of vital importance to the man responsible for the showing that the motor truck makes.

The plant of the States Motor Car Co., formerly operated by the Michigan Buggy Co., at Kalamazoo, Mich., has been purchased by the Barley Motor Co., which has a prospect of a large government truck contract. The plant has more than 250,000 square feet of floor space.

CONSERVING GASOLINE.

The war necessities of the nation have impelled every practical economy in gasoline fuel. Claim is made that there is considerable wastage through handling from leaks and drippings and carelessness of those selling or filling both storage and vehicle tanks. Much of this loss can be obviated by the use of a visible gasoline dispenser that is designed for installation at all stations where fuel is supplied. This is the Brady Dispenser, which is driven by a Westinghouse quarter horsepower motor installed in the base, entirely enclosed, in accordance with the requirements of the National Board of Underwriters.

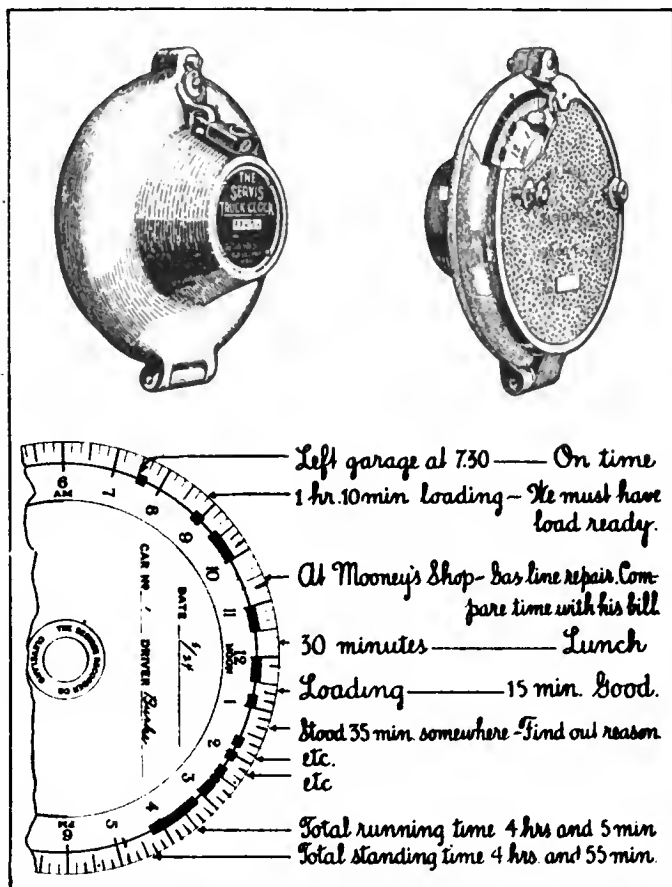
This apparatus is said to deliver a full gallon for every gallon ordered. When gasoline is delivered to the station the tank gauge shows accurately the full quantity stored in the tank. Every gallon drawn from the tank into the dispenser is shown on the tank register, which can be checked with the tank gauge. Thus both the public and the station owner are protected from loss. Incidentally, oil companies may make more rapid deliveries than by measuring cans from the vehicle tanks to the station tank where the dispenser is installed.

DIXON CHAIN LUBRICANT.

Broad claims are made for the quality of a graphite motor chain compound manufactured by the Joseph Dixon Crucible Co., Jersey City, N. J., that is prepared especially for lubricating drive chains of power trucks. Emphasis is made of the necessity of thoroughly cleaning chains before applying the compound, so that all parts may be covered. Recommendation for use is that the chains shall be washed carefully in gasoline or kerosene, after which they are boiled for 20 minutes in the compound, which liquifies when heated, so that there shall be the fullest penetration, and the compound is then set by dipping the chains in cold water. The compound of grease and graphite coats all wearing parts, minimizing friction. The company maintains that chains treated as stated will not only have high power transmitting efficiency, but will endure from two to three times as long as when less carefully lubricated.

NEW TITAN TRUCK AGENT.

The Ksufmann-Morris Co., 57th street and Broadway, New York, N. Y., distributor for Nash and Premier cars in that city, has become the agent and distributor for southern New York, New Jersey, Maryland, Virginia, southwestern Connecticut and a part of southeastern Pennsylvania, contiguous to Philadelphia, for Titan trucks, these including the 3½-ton "Hi-Way Transport" and the 5-6-ton "Heavy Duty" models. This company has available an ample supply of spare parts, and is ready to afford a degree of service that will no doubt be satisfying.



The Servis Recorder, a Newly Developed Instrument for Indicating All Truck Movements, and a Section of Chart and Note of Indication.

of the operating parts of the truck. It will indicate the time of starting and each stop, the duration of the stop and when start was again made, so that the record is complete so far as movement of the truck is concerned. The instrument is sold for \$28, which is much less than the prices for which similar devices have heretofore been valued.

The Servis Recorder consists essentially of a specially constructed clock movement that is, with a marker or indicator and a chart entirely enclosed in a heavy metal case. There is no outside connection, but the device may be bolted to the truck chassis or body in any one of a dozen convenient places, and, in fact, it would indicate if it were

WRIGHT ROLLER BEARINGS FOR FORD CHASSIS.

The Wright Roller Bearing Co. is now producing a bearing specially designed for use on the front axles of Ford chassis (which is sold by the National Bearings Service Co., Broad street and Girard avenue, Philadelphia,) which has some exclusive qualities and which are claimed to obviate a trouble that was found in all types of roller bearing for this particular use.

Statement is made that from the time when roller bearings were first installed on Ford chassis front axles a condition was found to obtain that often caused ruin of the bearing after driving but a few hundred miles. This was due to the manner of mounting, for the shoulder which holds the bearing was not suited to this construction and the bearing could not be held firmly. As the bearing would "cock" on the seat after a short period of use it would be unequally worn and no longer serviceable.

To prevent this wear the Wright roller bearing has been redesigned and the inner ring is now made in such a manner that there is a seat at right angles to the outer face. Patents are pending on the design and it is not used by other bearing manufacturers, as to do this would necessitate changing the entire construction. This is claimed to be another point of superiority for Wright cageless bearings.

HARRY B. WILLOWER DEAD.

Harry B. Willower, sales manager of the Gramm-Bernstein Motor Truck Co., Lima, who was for a number of years connected with that and other companies with which B. A. Gramm has been an executive, died recently at his home at Lima. He is survived by a widow and daughter. Mr. Willower was widely known and his personal endeavors contributed in no small way to the success that has been gained by the Gramm-Bernstein company and the concerns that preceded it.

McLEAN JOINS ONEIDA CO.

E. M. McLean, who is widely known in the truck industry and trade, who was for a considerable period advertising manager for the Four Wheel Drive Auto Co., Clintonville, Wis., and later manager of advertising and sales for the Stegeman Motor Car Co., Milwaukee, Wis., has become connected with the Oneida Motor Truck Co., Green Bay, Wis., and is attached to the office of the director of sales.

NEW NASH TRUCK PRICES.

The Nash Motors Co., Kenosha, Wis., by General Sales Manager C. B. Voorhis, announces that beginning Sept. 1 the prices of its truck chassis were as follows: Model 2018 (one ton), \$1650; model 3018 (two-ton), \$2175, and model 4018 (Quad, two ton), \$3250. These quotations are f. o. b. at Kenosha.

Every Employer Can Help the Nation and Help Himself Under This Plan

On pages 12 and 13 of this issue is published the announcement of a plan in which under an organized method the cooperation of every employer is requested in order to help in the promotion of the Fourth Liberty Loan. That announcement is worthy of your careful and immediate attention and action.

It is certainly not difficult to see how the energetic carrying out of this plan may produce results helpful not only to the Liberty Loan, but to American business.

The tremendous impetus which Charles M. Schwab has given to shipbuilding has been largely achieved by making every individual engaged in the industry feel a personal responsibility for results and a personal pride in helping to make great results possible.

This spirit of accomplishment in the shipbuilding industry has been brought about by the leaders—the employers—the bosses; whatever you choose to call them; making it a business to come in personal contact with the workers and to inspire and enthuse the men with a sense of the importance of their work for victory in the war—a sense of personal responsibility, and a spirit of team work.

The creation of that spirit among the workers of the nation in all lines of activity would be of incalculable benefit to the workers themselves, to employers and to the nation.

Concretely two of these results would be:

1. To quicken and increase the response to all war measures such as Liberty Loans—War Saving Stamps—the draft—food and fuel saving.
2. It would make the worker feel more keenly his responsibility to do his work (no matter what its character) to the best of his ability. Make him feel the necessity of sticking closely to his job.

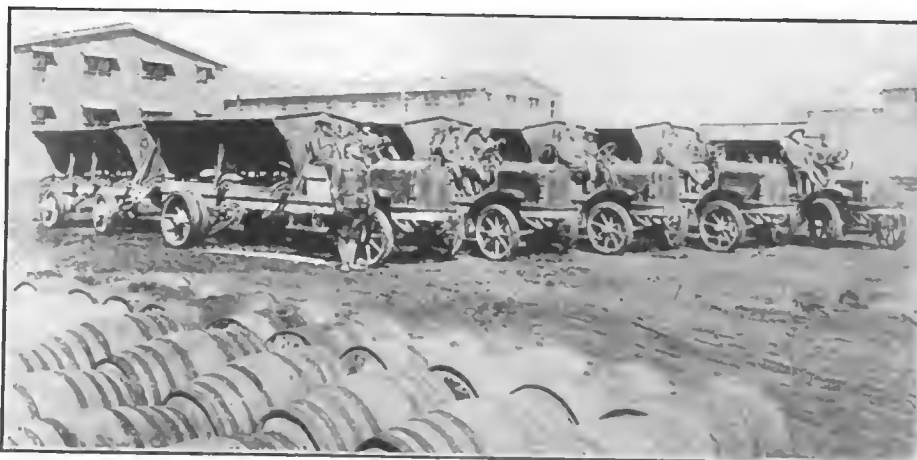
Employers generally should pursue with intelligent enthusiasm the plan of "Win-the-War" meetings proposed as a means to aiding the rapid flotation of the Fourth Liberty Loan. The results of such action will not only be helpful in the Loan drive, they will be permanently helpful to the nation through the development of a keener realization by the worker of the importance and dignity of his individual job and the necessity for personal responsibility and helpful team work.

Every employer can be a leader and a center of influence in this work.

The man who operates a small business with relatively few employees may feel that his circle of influence is too small to be worthy of any effort. That is a mistake. It is the aggregate that counts, as the announcement of the plan very clearly points out.

The man who is in a relatively small circle may not hold so pretentious a meeting—it may not be formal or run under parliamentary rules—it may not be especially announced, or accompanied by music and oratory. But the man who will quietly call a dozen employees around him and informally, thoughtfully, lead discussion into win-the-war channels, pointing out the importance to the individual of doing his best in support of Liberty Loans and all other war activities, can do a real service in this way. It can be so well done in no other way. And 10,000 such little meetings would produce an enormous aggregate result.

Whether his opportunity be great or small every American business man should carry out this idea in a definite systematic manner. The "Program" booklet which is mentioned in the announcement will be found tremendously helpful in its suggestions as to what should be done under any circumstances.



Fleet of 10 White Trucks, Equipped with Lee Side Discharge Bodies. Used by the Sanitary Department of One of the Principal Army Cantonments. These Vehicles Being Regarded as Especially Adapted for This Service.

West-Oneida Close Contract for 19 States

The West Motor Co., 19th and 20th streets and Avenue B, New York City, has made one of the largest undertakings in the truck industry in a long time in making a contract to distribute Oneida trucks in 19 eastern states, from Maine to Florida, as well as having the export trade rights.

The Oneida Motor Truck Co., manufactures trucks at Green Bay, Wis., and a very large part of its production will be turned over to the West Motor Co., which will develop a sales organization that will cover the eastern section of the country, as well as being represented abroad.

The Oneida Motor Truck Co., is well organized and established, having a model plant, with a site of 50 acres, and it produces five different sized machines, ranging in capacity from 2000 to 10,000 pounds, and the works are stated to have a capacity of 3400 trucks a year when operating fully in every department. The president of the company is F. E. Burrall, the secretary J. P. Neugent and the treasurer is Mitchell Jobannes.

The West Motor Co. has a new building covering practically a block, nearing completion, at the location stated, where the metropolitan sales organization, service station and temporary general offices will be maintained. The company was organized in 1913 by Sidney J. West and others with offices at 1790 Broadway, and specialized the distribution of trucks. Previous to engaging in business Mr. West was connected with several truck manufacturing concerns. He has, of course, intimate knowledge of the industry and trade, and his business was developed with policies and methods that has established it as one of the largest concerns of the kind operating in the East and possibly in America. The personnel of company will be announced as soon as reorganization has been effected.



Fleet of Trucks Equipped with Bodies Designed for Carrying Meats from Packing Plants and Refrigerator Cars to Army Cantonment Cold Storage Warehouses.

REPEAT ORDERS BASED ON TRUCK SERVICE.

According to Vice President of Sales Harry A. Conion of the Acason Motor Truck Co., Detroit, who has obtained substantial orders for trucks from the American Ship Building Co. of the Emergency Fleet Corporation, for use at the Hog Island ship yard, the service obtained by the machine now in use has been sufficient recommendation for the buyers. He maintains that Acason trucks are standard at Hog Island and that the fleet is being constantly increased in size. The work at the yard is practically continuous, going on day and night, and the machines are worked much harder than they would be in normal conditions.

The Acason company has also received orders recently for a number of trucks from the Dupont Engineering Co., which has been organized by the Dupont interests to operate on a large scale. Both of these orders were for the five-ton size, which is used almost exclusively at Hog Island.

HALL TRUCK PRICES.

The most recently issued quotations of prices for Hall trucks, built by the Lewis-Hall Iron Works, Detroit, Mich., covering chassis with priming coat and f. o. b. at the factory, are as follows: Two-ton worm driven, \$2675; 3½-ton worm driven, \$3500; five-ton worm driven, \$4500, and five or seven-ton chain driven, \$4500. These prices were effective as of Aug. 1, but conditions with reference to manufacturing and materials may necessitate changes for which notice cannot always be given simultaneously.

Harold D. Graves, for a considerable period sales manager of the New York City branch of the Packard Motor Car Co., has resigned and may enter the service of the United States.

The Sewell Cushion Wheel Co., Detroit, Mich., has declared a seven per cent. dividend on both the preferred and common stock outstanding.

Collins New Nash Sales Manager

The announcement is made by C. B. Voorhis, general sales manager of the Nash Motors Co., Kenosha, Wis., that L. F. Collins has been made sales manager of the truck department to succeed H. C. Hart, who retired from that position Aug. 5 to accept a commission as captain in the Ordnance Department of the United States Army. Mr. Hart determined to accompany the next contingent of selected men from Kenosha and made application to the draft board to be included in it, but his capacity was recognized and he was commissioned and attached as stated.

Mr. Collins is widely known through connection with the vehicle industry and trade for more than 16 years, and with the Nash organization for more than a year. He was for nine years head of the L. F. Collins Co., at Madison, Wis., which was the sales agent for the Owosso Carriage and Sleigh Co., and when the Owosso company suspended operations he continued business with animal vehicles manufactured by the Lull Carriage Co., Kalamazoo, Mich. Later on he became connected with a Chicago company and his experience was manufacturing, distributing, retailing and traveling representative. When he joined the Nash company he was made supervisor of southeastern Wisconsin. The results he obtained were such that he was selected as Mr. Hart's successor.

ECONOMIZING CITY COSTS.

A. H. Craebe, commissioner, and W. P. Gillespie, supervisor of the street department of Salt Lake City, Utah, met the shortage of labor when street sprinkling was begun by buying a Federal 3½-ton truck chassis and a 1000-gallon combination sprinkler and flusher, which replaced four teams of horses as well as four drivers, with but one man. The truck was first worked eight hours a day, and when the demand for service increased it was worked two eight-hour shifts, doing the work of 16 animals, eight drivers and eight tank wagons or flushers, a very large saving as a whole. Not only this, the work is much better done.

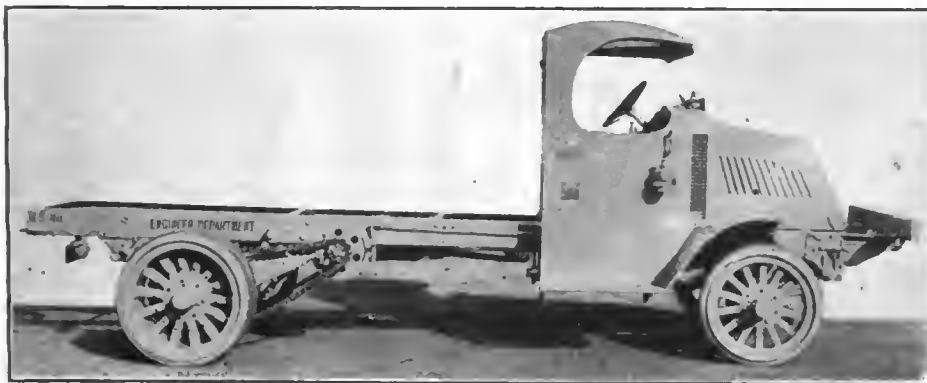
BLUMBERG MOTOR CO.

H. G. Blumberg is president, E. W. Anderson and E. O. Dean vice presidents, J. M. Dullahan secretary and treasurer, and Lee Woodworth, W. H. Litchfield and H. J. L. Stark, with the officers, are directors of the Blumberg Motor Co., organized at Orange, Tex., with capital of \$100,000 to establish a plant and manufacture farm tractors and power trucks.

The Lauton Truck Co., Youngstown, O., has made Ralph J. Handy, formerly a distributor of Tonford chassis conversion units in Detroit, its sales manager.

MACK AC TRUCKS AND TRACTORS

Chassis Standardized in Design, as 3½, 5½ and 7½ Tons for Body Loads and 7, 11 and 15 Tons for Semi-Trailers



The Mack AC 5½-Ton Chassis, Complete with Cab. This Type Adopted for the Engineer Department, United States Army.

STANDARDIZATION of a single design for each of the two series of Mack trucks it builds has been perfected by the International Motor Co., New York, N. Y. The one series is designated as AB trucks, these having rated load capacities of one, 1½ and two tons, and the other series is specified as AC trucks, having rated load capacities of 3½, 5½ and 7½ tons. The AC series is also built with short chassis for use as tractors with semi-trailers, and these are given load ratings of five, seven, 11 and 15 tons.

The AB series are built either worm or chain driven, but the AC series are chain driven exclusively. The purpose of the company has been to standardize manufacturing equipment and methods, this economizing time and labor, and standardized machines greatly simplifies service. Simplification of service is a very important factor with all manufacturers building trucks in large numbers. The service department of any well established concern constructing trucks increases very rapidly and as service must be afforded wherever trucks are sold and used the organization must be thoroughly systematized and have ample stock available with which to supply any demand that may eventuate.

The International Motor Co. was formed with the consolidation of the Mack Brothers Motor Truck Co., the Hewitt Motor Truck Co. and the Saurer Motor Truck Co., and its plant was established in New York City. The product of the company is now known by the trade name "Mack," this being the continuation of the trade name of one of the original companies. The company also produces Saurer trucks, these being in large capacities only, but they are not used as generally nor are they so well known as the Mack trucks. As the service of the company necessarily extended to all trucks produced by the original companies, the experience proved that standardization was necessary so far as this was practically pos-

sible, and for several years production has been concentrated on the AB and AC series.

No Changes in the Designs.

The company engaged in standardization with the intention of continuing the designs for considerable periods, and the details were developed and perfected with extreme care before the designs were finally approved. The development and experiment was carried on for a sufficient time to establish the trucks as comparable with any others for endurance, dependability and operating economy, and since production was begun there has been no reason to make material changes in dimensions, forms or materials.

The series which will be principally dealt with in this article is the AC, this including the trucks and tractors built for heavy duty, and statement should be made that the power plant in all of these is identical, the principal differences being in dimensions of other construction units aside from the power transmis-

sion system. Trucks of each load rating are built of three wheelbase lengths, 156, 168 and 180 inches, the buyer having choice of what will best suit his purposes. The tractor chassis are all built the same wheelbase, 119 inches, there being no necessity for variance in this respect.

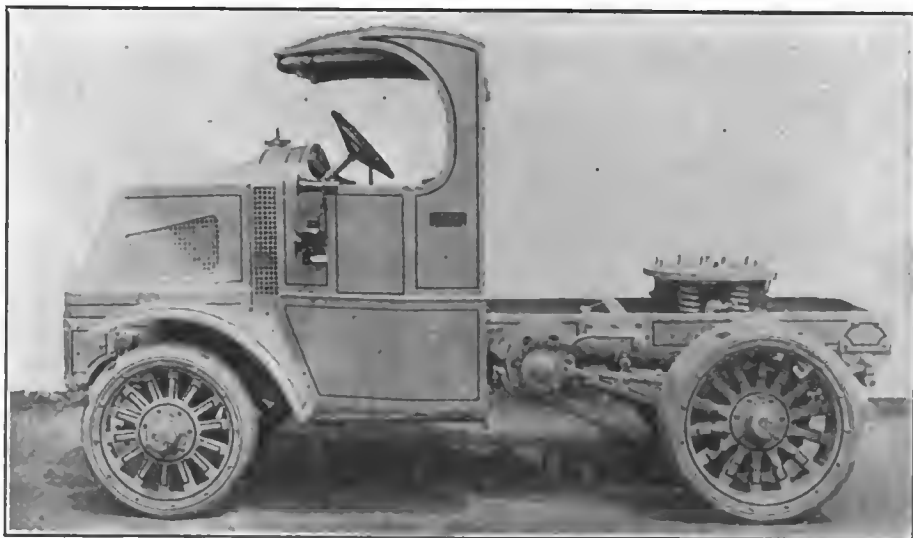
All Parts Built by Company.

Mack trucks are not constructed from parts obtained from construction unit manufacturers, but the machines are built specially to the exclusive designs of the company and for this reason they embody a number of characteristics that are claimed to have unusual service value. The design is what may be termed modification of that known as the Renault, the dash and radiator being assembled as a unit behind the engine, the radiator being cooled by air drawn exhausted through the sides by a fan in the dash.

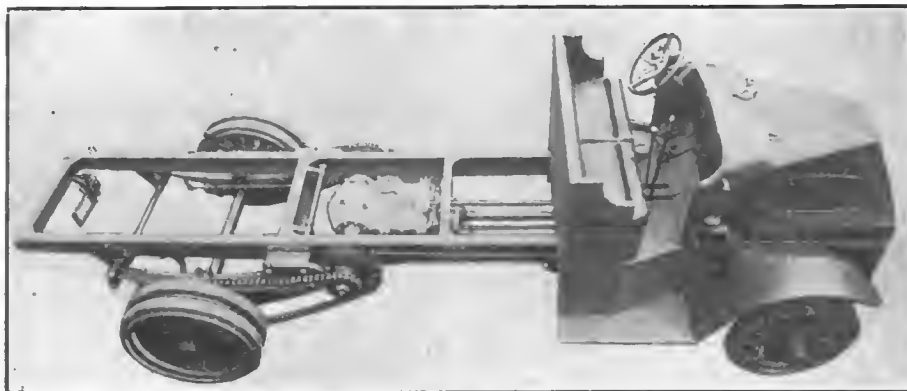
The engine is a type designed and built purposely for truck propulsion and it is cooled and lubricated by systems that have been developed with extreme care to obtain efficiency and dependability. The lubricant is heated to a temperature that insures effective lubricity and at the same time the temperature is maintained below a certain point. The crank case is more accessible than is that of the conventionally designed engine, and the crankshaft is a three-journal type with journals three inches diameter, this construction being intended to insure against whipping and to minimize bearing wear because of the very large area of the main bearings.

Engine Develops 40 Horsepower.

The engine is a four-cylinder, four-cycle, water cooled, vertical, L head type, the cylinders having bore of five inches



Mack AC 3½-Ton Chassis, with Cab, Equipped with Universal Fifth Wheel, for Use as Tractor with Semi-Trailer.



Top View of the Mack 5 1/2-Ton AC Chassis, Showing the Location of the Transmission Gearset and Jackshaft, and the General Construction Details.

and stroke of six inches. The rating by the S. A. E. formula is 40 horsepower at 1000 revolutions a minute, which has been exceeded during a 100-hour continuous brake test, and at 1400 revolutions 71 horsepower has been developed. From these statements the reader may understand that the engine will develop power considerably in excess of the greatest demand that can be made in practical operating conditions.

The cylinder units are cast in pairs from a high grade gray iron, with the very long water jackets integral, the valves being at the right sides of the castings. The units are made with large openings above the combustion chambers of the cylinders that are closed with plates in the centers of which are the connections that, when coupled, form the water outlet manifold. The castings have wide base flanges and cast integral with the units for the forward cylinders are oil reservoirs and ducts for the transmission of lubricant to the main bearings. Under the valve pockets are webs surrounding the valves and tappets that are enclosed with covers.

All Cylinders Are Annealed.

The cylinder units are tested by water pressure to detect casting defects and are then bored. They are next annealed to insure against distortion from casting stresses, and are then finish bored and ground. The units are not affected by variations of temperature when produced

with this process. The pistons are cast from a high grade metal and after inspection and test are rough turned, annealed and ground to exact dimensions. Each piston is made three different diameters, the smallest at the top and the intermediate next below, the variance being intended to compensate for the varying expansion of the metal, which decreases gradually from the top to the bottom of the skirt. The piston bosses are bored for the wristpin bearings.

In the pistons are cut two ring grooves, a single one above and a double one below, the lower backed by a "bulb ring." The rings are concentric, peened to obtain equality of circumferential pressure and complete resistance to expansion pressure. The ring fitting is very carefully done. When the pistons are finished the series for any one engine are balanced and are the same weight.

Crank Case in Two Sections.

The crank case is cast in two sections from aluminum alloy, there being a central vertical transverse web that carries the centre main bearing, and there are forward extensions of both sections that form the housing for the timing gearset. Into both sections are cast copper ducts that form a part of the lubricating system, this insuring against the possibility of leakage and breakage that may obtain with the use of pipe connections.

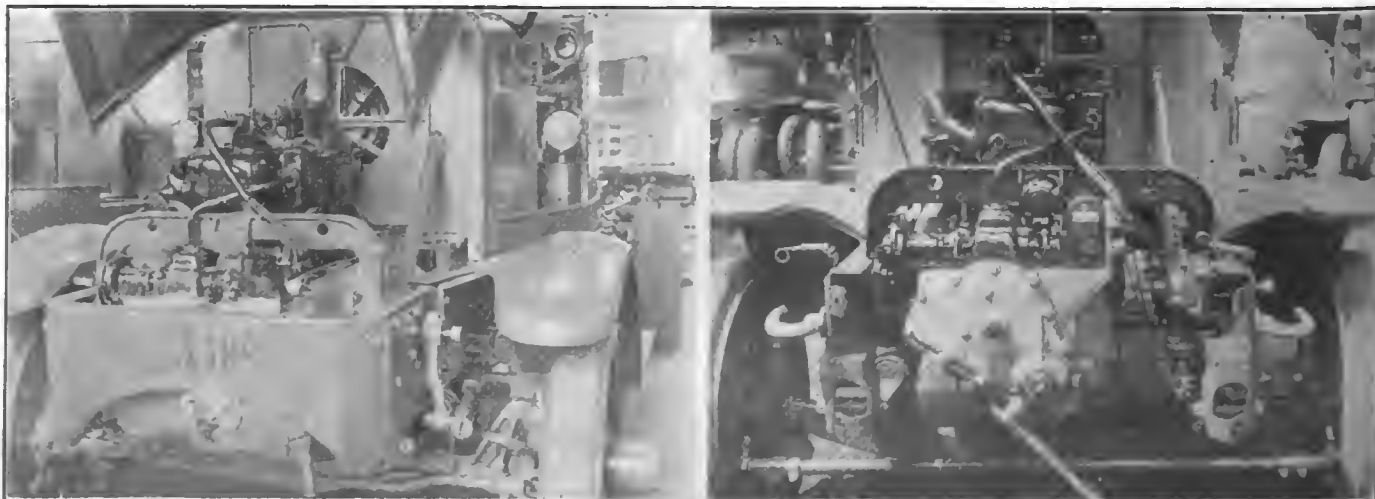
The sections are ribbed to have rigidity and the bottom of the lower section is heavily finned to radiate the heat from the oil reservoir. At the left side of the upper sections are two large hand holes that are covered with plates retained by clamps, through which the main and connecting rod bearings and retention bolts may be examined.

The crankshaft is a special steel drop forging that has three journals three inches diameter and the four crankpins are 2 3/4 inches diameter, the journals being 3 3/4, 3 1/4 and four inches length, a total bearing length of 10 5/8 inches. The shaft is heat treated, ground and case hardened, the object being to make the journals especially resistant to wear. The flywheel flange is forged integral with the shaft. The crankshafts are balanced separately and when assembled with the flywheels, to obtain true running balance.

Camshaft and Connecting Rods.

The camshaft is drop forged from a special steel alloy with the cams and a helical gear for driving the oil pump integral. The cams have 5/8-inch faces. The shaft is 1 5/16 inches through its smallest section. The shaft is finished by case hardening and grinding to size. It is mounted on three bearings, each 2 3/4 inches diameter, and it is so constructed that when assembled with the timing gear and the governor weights it can be withdrawn when the cover of the timing gearset case is removed.

The connecting rods are very long, being 15 inches length on centers, this unusual proportion being to minimize side thrust and obviate piston slap in the cylinders. They are I section steel drop forgings, extremely light in weight, with the small ends designed to clamp the wristpins, and the crankpin caps, which are retained by four nickel steel bolts each, are forged with the lubricant dippers integral. The four rods for any one engine are of equal weight. The light pistons and connecting rods and the balance obtained minimizes the vibration resultant from reciprocating action. The wristpins are steel tube, 1 7/16 inches diameter, case hardened and ground, that secured to the connecting rods as



The Front of the Mack AC Chassis: At Left, the Combination Front Frame Cross Member and Bumper in Place; at Right, the Cross Member Removed, Showing the Accessibility of the Power Plant.



The Mack Circular Radiator, Built of Copper Tube and Aluminum Tanks, Its Flexibility Minimizes Influence of Shocks and Vibration.

cillate in bronze bushings in the piston bosses.

Bearings and Timing Gears.

The bearings for the crankshaft and the crankpin ends of the connecting rods are bronze cages lined with special babbit metal, these being fitted with shims to obtain close adjustment, and the camshaft bearings are bronze. The front and rear main bearing caps of the crankshaft are retained by heavy through bolts, those at the front extending through the lower part of the universal link that supports the engine from an arched yoke carried on the frame side members, and those at the rear extending through the beam that supports the unit. The yoke and the beam are steel, drop forged, and both are bolted to the chassis frame. This construction insures a three-point suspension, the forward universal link being a pivot so that there is no cramping of the engine case from chassis distortion.

The timing gearset consists of three gears, one for the crankshaft, one for the camshaft and one that drives the mag-

neto and water pump shaft. These gears are large, have wide faces and are helical cut. The magneto and water pump shaft is transverse at the front of the engine, and is driven by a gear in the center, covered by a housing. With this design the gearset is extremely accessible and is greatly simplified. The governor is incorporated with the camshaft timing gear and consists of a pair of weights that are supported on guides and retained in position by helical springs. As the speed of the gear is increased the centrifugal force causes the weights to separate and this movement actuates a butterfly valve in the fuel intake manifold, which reduces the supply of gas to the cylinders.

The valves are large diameter and are made from special alloy steel forgings with hardened stems. These are fitted in long bushings. The valve tappets are the sleeve and roller type, carried in renewable guides, fitted with adjusting screws and nuts, and the entire mechanism is enclosed by cover plates that can be quickly removed.

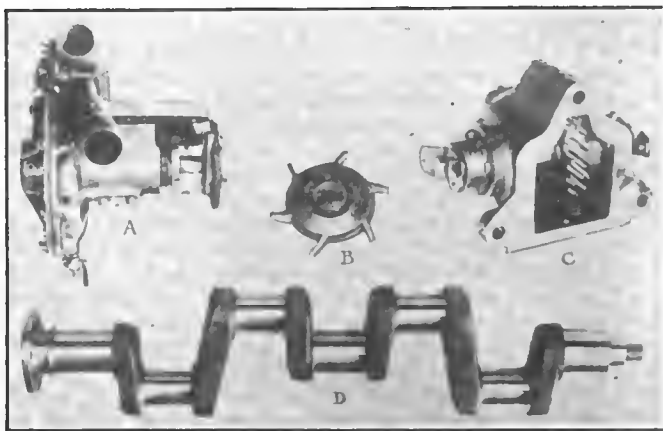
The exhaust manifold is a double-chambered or twinned type that is ribbed to have strength and increase radiation. The water and fuel inlet manifolds are combined in a single casting, this water jacketing the gas intake and insuring the mixture being well gassed, while the number of fittings and connections are minimized.

The engine is cooled by a circulation of water through the cylinder jackets and a tubular radiator, forced by a centrifugal pump that consists of a bronze rotor on a steel shaft and a cast iron housing. The rotor is balanced by feeding the water to it from both sides, so that there is the same pressure at either side and there is not undue wear. The pump is driven by a universal leather

coupling and can be easily disassembled. Special construction insures against leakage past the pump shaft.

Radiator a Special Type.

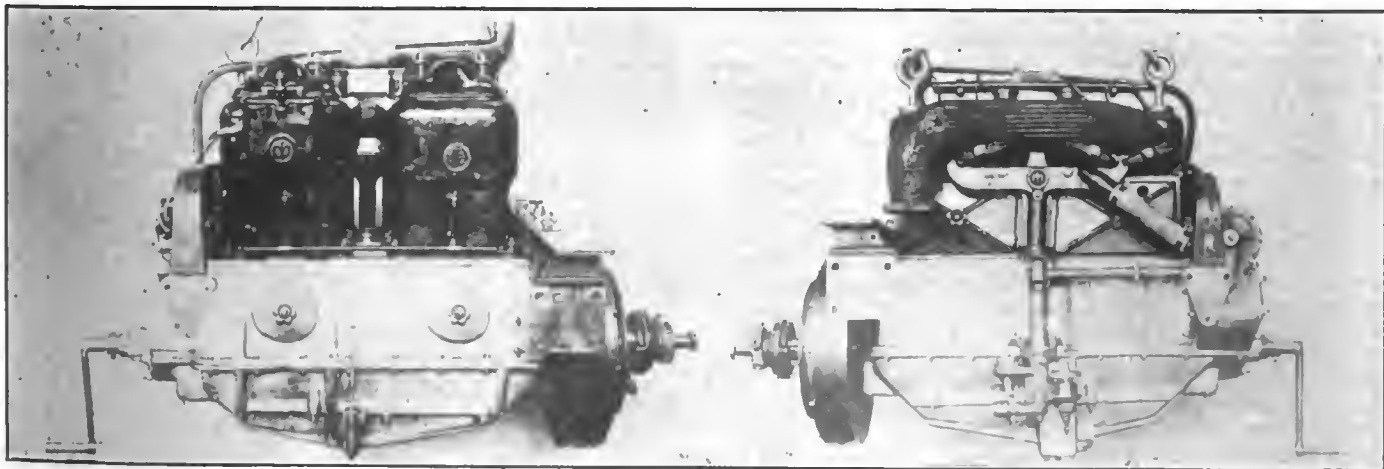
The radiator is the center section of three sections that form the dash, the side units being designed for the delivery of the air that is exhausted over the tubes of the radiator from the driver's compartment and across the engine through gratings in the hood. The dash sections are cast aluminum and united form a cowl, the sides extending back to the cab door. The radiator header or tank and the bottom tank, which is part of the frame that carries the radiator, are connected by two semi-circular series of small copper tubes surrounding an opening in which a large fan is located, which exhausts the air through the



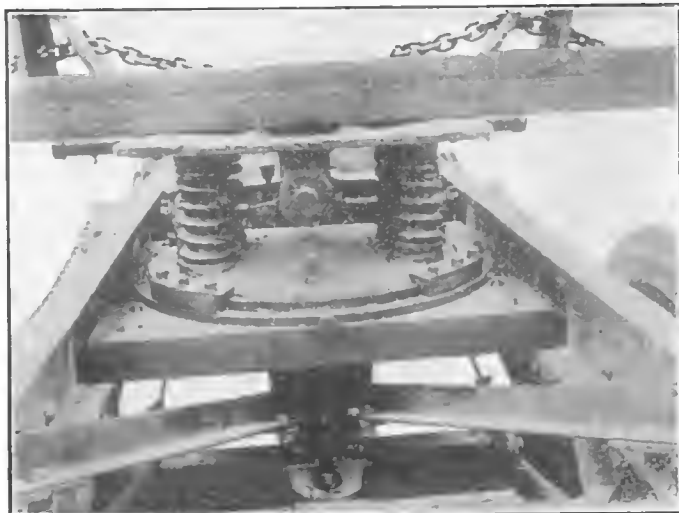
Components of the Mack AC Engine: A the Water Pump Assembly; B, the Specially Designed Water Pump Rotor; C, the Crossshaft Gear Housing; D, the Three-Journal Crankshaft.

tubes outward through the sides.

The radiator is constructed without solder, the ends of the tubes being expanded into plates that are bolted to the top and bottom tanks. The tubes are annealed copper and the form is such that they have a considerable degree of elasticity, and they are not affected by changes of temperature or shock, as rigid construction would be. Should leak develop any tube may be obstructed at the header or bottom plate by plunging the end, or by pinching it flat. The fan is a blower type and is carried on a shaft



The Mack AC Standardised Power Plant: At Left, the Left Side, Showing the Oil Reservoir Cast on the Forward Cylinder Unit; at Right, the Right Side, with the Unusual Exhaust and Gas and Water Intake Manifolds.



The Universal Fifth Wheel Equipment for Tractors and Semi-Trailers; the Permanent Type, with Helical Cushioning Springs.

on roller bearings that is driven by a V belt from the flywheel of the engine.

Highly Efficient Lubricating System.

The engine is lubricated by a combination of splash and gravity feed that is maintained to have exceptional efficiency. The lower section of the crank case serves as an oil reservoir, this having a series of external fins that radiate the heat from the oil. In this reservoir is the intake of the oil pump, driven by the gear on the camshaft, and the lubricant is drawn from this and is forced through the main duct cast in the crank case through tube to a sight gauge on the dash and thence to the oil reservoir on the left side of the front cylinder. From this the oil is carried by gravity through ducts in the cylinder unit and the crank case castings to the three main bearings and to the four oil troughs under the big ends of the connecting rods in the base of the crank chamber.

The overflow from the reservoir on the cylinder is carried by a tube to the timing gearset. Thus the main bearings and the gearset are flooded with oil. The oil is distributed by the dippers on the caps of the connecting rods by splash to the cylinders, pistons, crankpin and wristpin and camshaft bearings, the cams, tappets and the oil pump gear. The valves are lubricated by the breathers into the pockets enclosing them. The overflow of oil from the troughs and the drainage from the splash is carried to the oil reservoir and again circulated. There is a screen in the cylinder reservoir, so the oil is twice filtered during its circulation. The oil pump is a gear type and it is so constructed that it may be removed without dismantling the engine should occasion require. The oil is replenished at the cylinder unit reservoir, which has a cover retained by a clamping yoke that can be quickly taken off.

The fuel is carbureted by an automatic float feed carburetor that is said to be very efficient, being supplied from a 25-gallon tank. The source of ignition current is a high-tension magneto with a storage battery and vibrating duplex coil that is auxiliary for starting. The magneto is located at the left side at the forward end of the engine case, at the

end of the cross shaft. All the wiring is enclosed in fiber ducts and is effectually protected.

The clutch is a dry plate type that is housed in and driven by the flywheel. It consists of two driving members, one of which is the flywheel and the other a movable cast iron ring. The driven member is a friction ring riveted to a steel disc riveted to a hub that slides on the splined clutch shaft. The movable ring is held in contact with the driven

member by nine helical springs secured to the clutch cover, which is bolted to the flywheel. The driving ring is actuated by three levers fulcrumed in the clutch cover and three fingers on the forward end of a sliding sleeve that is operated by a self-aligning ball bearing at the rear end and a fork on the clutch pedal shaft. There is a clutch brake that is engaged by pressing the clutch pedal ahead of the position that fully releases the clutch.

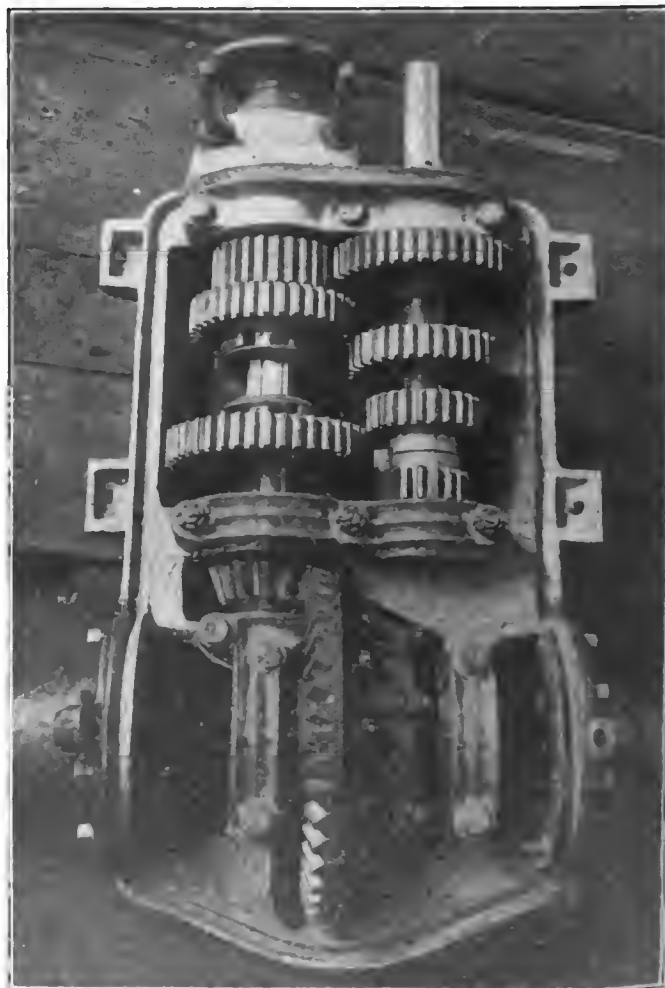
The transmission gearset and the jackshaft are assembled as a unit, and this is suspended at the forward end from a frame cross member and the jackshaft housing outer ends are carried in brackets on the frame side members. By this construction cramping and stresses from chassis distortion are obviated. The transmission gearset housing is cast in two sections, the upper section carrying the main and countershafting, gears, bearings and operating mechanism, the lower part supporting the reverse gear idler only. The housing is cast aluminum. The lower section is secured to the upper half by three bolted straps that are quickly removable. The

sections are assembled with a felt gasket between them. The gearset has three forward speed ratios and reverse. The gears are special alloy steel, heat treated and case hardened, the main shaft is a similar high grade metal and the countershaft is nickel steel, heat treated. The shafts are mounted on Timken bearings, the countershaft extending through the case for operating a hoist, winch or pump. The reverse idler gear is also mounted on a Timken bearing.

The rear end of the case houses the differential gearset, this being a bevel gear type, the live shafts being housed by cast aluminum sections that are bolted to the case. The shaft bearings are at the outer ends of the housing. The differential gears are heat treated alloy steel and the driving shafts nickel steel, the brake drums, to which are bolted the chain sprockets, being keyed to the outer ends. The drive to the rear wheels is by roller chains.

Frame, Springs and Axles.

The frame is constructed of pressed steel channel section eight inches width with three-inch webs of 7/32 metal, with heavy cross members, strongly reinforced and gusseted. The front cross member of the frame is removable to afford access to the power plant and is retained by bolts. This member is very large and serves as a bumper. All holes in the frame are drilled and there are no



Mack Combination Transmission Gearset and Jackshaft Differential, with Lower Section of Case Removed.

holes in the lower webs of the frame members.

The frames are suspended on semi-elliptic springs, the rear sets being outside the frames. All spring eyes are bronze bushed and the spring bolts are hardened and ground. All bolts and shackles are adequately lubricated. The rear axles are rectangular chrome nickel steel drop forgings with large spindles, and are fitted with Timken roller bearings. The radius rods are fitted to circular seats on the axles and the forward ends are pivoted in heavy brackets independent of the jackshaft, the driving thrust being distributed to the frame. The front axles are I section chrome nickel steel drop forgings with large steering knuckles and spindles that are fitted with Timken roller bearings. The wheels are wood, artillery type, the front sets 36 inches diameter and the rear sets 40 inches diameter. The tire equipment of the 3½-ton chassis is 36 by five inches front and 40 by five inches dual rear; of the 5½-ton chassis 36 by six inch front and 40 by six inch dual rear, and of the 7½-ton chassis 36 by seven inches front and 40 by seven inch dual rear. The tires are solid bands, although buyers may have block rear tires if desired. The front tread of the chassis is the same, 68 inches, but the rear treads are 71½, 74½ and 76½ inches respectively.

The steering wheels are at the left side and the control is by foot pedals for the clutch and service brake, the latter being an external contracting type on drums 15 inches diameter on the jackshaft axles. The brake drums are cast with fans and openings to obtain air cooling, and the brake shoes are finned to radiate the heat. The ignition and throttle levers are on the large hand wheel, and on the dash is grouped the electric switch, oil indicator and other instruments. The emergency brake and gear shifting levers are at the center of the foot board. The emergency brake has internal expanding shoes within drums 20 inches diameter and 3½ inches width. All brake adjustments can be easily made. The steering linkage is ahead of the front axles and the gear is a worm and gear type so designed that final thrust of drag link is taken through a special chrome nickel steel forging on a square shaft that can be tightened.

The standard jackshaft sprockets can be varied in number of teeth to obtain faster or slower movement of the trucks at a given engine speed. All chassis are equipped with drivers' seats of steel frame and sheet steel paneling. The sides of the seat extend to the running boards, meeting the front fenders. The seat has sliding doors that drop vertically behind the lower extensions of the seat sides, which latch when raised, the tops being in line with the arm rails and the dash sections. The seats are leather cushioned in two sections. The gasoline tank and tool box are under the seat. When desired the chassis can be equipped with starting and lighting systems and all-metal cabs.

A great deal of attention has been given to detail. Opening a cock in the

pump housing will drain the radiator and there are separate drain cocks for both cylinder unit jackets. The provision for lubricating all moving parts has been thorough and there are breathers for the transmission and differential gearset housings. The engine crank is a folding type. All the dash instruments are accessible by removing one bolt and dropping the left side radiator screen.

The Tractor Chassis.

All tractors are designed for hauling seven, 11 and 15 tons with semi-trailers. These are fitted with universal fifth wheel connections, which may be either demountable or permanent. These consist of two cast steel circular plates, reinforced with ribs. On each plate are two bosses that carry the ends of shafts that carry a steel cross, the shaft pivots, being at right angles, affording a transverse or longitudinal action. Between the plates, near the circumferences, are four helical steel springs, seated on bosses. Two steel springs are placed between the lower plate bosses on the lower shaft, these serving to cushion the stresses of starting and stopping.

The lower plate fits into a recess in a steel ring bolted to the chassis platform, and it is held by shoulder blocks, but may turn in the recess. This construction affords three axes, so that there is no strain on the trailer or chassis no matter what the turn or the road surface conditions. All bearing surfaces of the fifth wheel are lubricated by eight grease cups.

The above description applies to the permanent type. When demountable there are two toothed plates, one of which is attached to the bottom of the forward end of the trailer and the other to the upper plate of the fifth wheel. The teeth serve as guides when coupling the tractor and trailer, and the connection is completed by inserting a lock bolt.

The Series AB Trucks.

The series AB trucks have a unit power plant that consists of a four-cylinder engine with cylinder bore of four inches and stroke of five inches, that is rated at 25.60 horsepower by the S. A. E. formula. This is equipped with a pumped cooling system and a honeycomb type of radiator, and a combination forced feed and splash lubricating system. The ignition current source is a high-tension magneto. The clutch is a dry plate type, and with a transmission selective sliding gear type gearset that has four forward speed ratios is combined with the engine. The power transmission is by a tubular shaft to a worm shaft and worm wheel rear axle, with bevel gear differential gearset, mounted on Timken roller bearings. The springs are semi-elliptical and the steering gear is at the left side. In the chain driven trucks the jackshaft is a separate unit and the drive is by chains from jackshaft to rear wheel sprockets. The one-ton chassis is built either 132 or 144 inch wheelbase, and the 1½ and two-ton chassis are built either 144 or 162 inch wheelbase. The wheels are artillery type, of wood. On all front wheels the tires are solid bands, 36 by four inches; on the one and 1½-ton chassis the rear

tires are either 36 by 3½ dual or 36 by six inch single, and those of the two-ton chassis are 36 by four inch dual. The maximum speeds of these trucks are 17.62 miles for the one-ton and 16.07 for the 1½ and two-ton.

MOTOR TRUCK SERVICE FACTS.

A new publication is "The Motor Truck as an Aid to Business Profits," written by S. V. Norton, manager of the truck tire sales department of the B. F. Goodrich Rubber Co., Akron, O., and published by the A. W. Shaw Co., Chicago. The book deals with the aspects of motor truck haulage from the viewpoint of the business man, and takes up a great diversity of subjects interestingly and with knowledge of their relative values. It is not a mechanical work, although it presents figures and facts concerning operation of vehicles, but more to illustrate methods of record and system regarded as necessary or desirable to obtain efficiency and economy. There is much valuable information obtained first hand from large concerns utilizing considerable numbers of trucks, and, of course, innumerable suggestions that can be practically applied. The book consists of 540 pages and has 335 illustrations of varying form.

WOLFE ENTERS THE SERVICE.

Assistant Chief Experimental Engineer William S. Wolfe of the Goodyear Tire and Rubber Co., Akron, O., has resigned that connection to enter the service of the maintenance division of the Motor Transport Corps, U. S. A., and is now attached to the headquarters at Washington, D. C. He is exceptionally well qualified for this branch of the service, as he had six years' experience in tire development with the Goodyear Co., especially observing the results of wear of tires, wheels and rims.

HAMILTON IS PRESIDENT.

The Lane Motor Truck Co., Kalamazoo, Mich., has elected L. W. Hamilton its president, which carries with it the general management of the plant and the business. E. W. Bitzler has been made secretary and treasurer of the company. Dr. W. W. Lang, formerly president of the company, resigned because of the press of other affairs.

E. P. Mussler, formerly with the De Luxe Automobile Co. of St. Louis, Mo., has been appointed general manager of the Master truck agency in that city.

William P. Taylor has been made sales manager of the Boston branch of the Garford Motor Truck Co. He was formerly connected with the Kissel Motor Co. of that city in a similar capacity.

Westel Gray has joined the St. Louis, Mo., branch of the Goodyear Tire and Rubber Co. He was until recently connected with the Western Automobile Co., Pierce-Arrow agent, as sales manager.

Patriotic Service, Urges Diamond Chain Men

Patriotism was dominant at a dinner given the evening of Sept. 12 by President L. M. Wainwright of the Diamond Chain and Manufacturing Co., Indianapolis, Ind., to a company that numbered 77 and included the heads of the different departments and divisions of the plant of which he is the executive. The dinner was pleasing as to cuisine, but the occasion was very largely for the purpose of stimulating patriotism and the activities of the guests in whatever would contribute to the successful prosecution of the war by the nation.

Following the dinner, after specifying the manufacturing plans of the company and its sales organization for the coming year, Mr. Wainwright urged upon the company that they manifest their patriotism by buying Liberty Bonds to the limit of their resources, and to use their influence with others to make similar purchase; that they buy War Stamps as freely and as frequently as they could



During the Dinner Given by President L. M. Wainwright of the Diamond Chain and Manufacturing Co., Indianapolis, Ind., to 77 Department and Division Heads.

do so with justice to themselves and dependents, and to exercise every endeavor in supporting the government in its war and war financing policies.

Secondary to these, according to the standards established by Mr. Wainwright, is that all of his 1000 coworkers exert their energies and talents toward bringing a continuous and increasing production of chain, which was needed directly and indirectly by the governments. He stated that all employees were expected to maintain rigidly the traditions of the Diamond Chain company for quality of product and service.

KISSEL TRUCK PRICES.

Beginning Sept. 1 the prices for Kissel trucks were established by the Kissel Motor Car Co., Hartford, Wis., as follows: General utility chassis, \$2073.50; freighter chassis, \$2832.50; heavy duty chassis, \$3905, and dreadnaught chassis, \$4785, all prices being f. o. b. at the factory.

GENERAL MOTORS WILL BUILD FARM TRACTORS.

The General Motors Truck Co., which has acquired the Samson Sieve-Grip Tractor Co. and is developing and equipping a department for production at Pontiac, Mich., which will be operated in connection with the Samson plant at Stockton, Calif., has bought control of the Janesville Machine Co., Janesville, Wis., manufacturer of farm implements, which will be operated largely for the manufacture of tools to be used with Samson tractors. The proposed operations of the General Motors Truck Co., tractor division, include the erection of a considerable addition to the Janesville property to build Samson tractors, and construction may be begun before the end of the year. The capital stock of the Janesville company is \$2,250,000, of which \$1,000,000 is common and the remainder preferred.

MACK TRUCK CATALOGUE.

The International Motor Co., New York, N. Y., has just issued a condensed form of catalogue that is briefly descriptive of the trucks and tractors it builds, these being rated as one, 1½, two, 3½,

5½ and 7½ tons for trucks, and five, seven, 11 and 15 tons for the tractor units.

Much of the booklet is given over to description and illustrations of the heavy duty trucks, setting forth the general characteristics of design and construction, and specifying wherein the machines differ. The detail is decidedly interesting, not only to the truck user and buyer, but to the engineer. Copies may be obtained by addressing the company.

A new catalogue, No. 20, has been issued by the Mifflinburg Body Co., Mifflinburg, Pa., which comprehensively illustrates and describes a series of bodies designed for Ford and other chassis. The company's plant is stated to have a capacity of 15,000 bodies annually.

A distributors' contract has been made with the Worman Motor Car Co., Toledo, O., by the General Motors Truck Co. to cover the northern Ohio territory.

Abandon National Shows Advises N. A. C. C.

The national automobile shows that have been held annually for 18 years in New York and Chicago have been abandoned for the period of the war by the National Automobile Chamber of Commerce. The statement issued by the chamber merely states that the directors voted to recommend to the manufacturers that the shows be given over until peace is declared, but that is equivalent to a declaration that no shows will be held that will be sanctioned by that body. There was a brief note to the effect that the directors of the chamber believed that holding shows would be inconsistent with the patriotic obligations of the industry.

The attitude of the chamber will no doubt be reflected by different dealer and motoring organizations throughout the country, and that there will be no exhibitions until conditions have been materially changed is certain. With reference to the New York and Chicago shows no displays of trucks were made in connection with these, other than at the salesrooms of local agents and branches, so that there will be no material effect. But in Boston and other cities, where large departments were devoted to truck exhibits, and in some instances where exclusive truck shows were organized, abandonment of the shows will have possibly more pronounced influence.

There is a vast difference, however, between display of machines that are wholly utilitarian and necessary in business and industry, and those that are not as essential. This is not meant to criticize the attitude of the National Automobile Chamber of Commerce, but to point out that there is no reason to believe that there will be less sales of trucks. In fact there is the best of ground for the statement that business men who want trucks will reach those who sell them, and as there is a very evident desire by truck owners to standardize on make of equipment, there is no good purpose served by "shopping" unless there is dissatisfaction with the vehicles owned.

The motor truck shows are desirable, and they undoubtedly convenience buyers who wish to examine different machines and types and determine what will best meet their requirements. They are not, however, absolutely necessary to the industry, and were conditions normal there would be abundant reason to continue them, and to make them as large and comprehensive as is possible. The giving over of the shows will necessitate the manufacturers directing the attention of business men to their machines by greater publicity and more intensive methods of selling.

The capital of the Dayton Castings Co., Dayton, O., has been increased from \$15,000 to \$50,000.

Highway Transport Labor Classed Essential

Seemingly the attitude of the government with reference to highway transportation is recognition that it is essential, and to afford all the assistance that is consistently possible so far as supplying such labor as may be necessary to maintain regular and sufficient service is concerned. The organization and maintenance of power truck services between commercial centers, either intrastate or interstate, and in rural communities has been promoted and stimulated so far as has been practical. The endeavors of the Council of National Defense, through the War Industries Board, the Highways Transport Committee, the state councils for defense, and different commercial bodies has resulted in crystallization of the opinion of business men and material support in many instances for concerns and individuals who were or are engaged in transportation.

There has been more or less uncertainty as to the attitude of the government through its Employment Service—whether or not the men employed in transportation would be regarded as essential workers and continued as such. Because of this uncertainty there has been considerable doubt expressed by those who might engage in highway haulage, whether they could continue after service had been established, for they had no knowledge of the policies of the Employment Service with reference to labor. In other words, if the employees of the haulage concerns were not regarded in essential work any organization might be disrupted and its workers assigned elsewhere.

The situation appears to be very much clearer with the issuance of a letter by the Highways Transport Committee, which is authorized by the Council of National Defense, which apparently establishes that the committee is to determine from facts in each instance whether or not highway transportation operations are essential. This letter is as follows:

Recognizing that the vital need for increasing transportation facilities of the country during the war may be realized only through the most effective utilization possible of the highways, the United States Employment Service has instructed its representatives to refer all labor problems arising in this connection to the Highways Transport Committee, Council of National Defense, to which committee all highways transport problems are being delegated.

The task thus delegated involves the adjustment of labor employed in any phase of transport activity, either power or horse drawn. In referring these duties to the Highways Transport Committee, J. B. Dens-

more, director general, United States Employment Service, has transmitted the following letter to R. C. Hargreaves, secretary of Highways Transport Committee:

Dear Sir:—

The U. S. Employment Service recognizes the war time need for making the most effective and efficient utilization of our highways as a means of strengthening and increasing our transportation resources, and especially is acquainted with the valuable direction given by the Highways Transport Committees to this problem.

We are also convinced that tonnage capacity of our highways transport resources can be greatly increased by applying all possible vehicles, horses and labor in line with national policies promulgated by you and, naturally, in transportation that vitally aids in accomplishing our war program.

We therefore desire to effect any adjustment of labor employed in any phase of highways transport activity, relating to either power or horse drawn vehicles, in cooperation with your national organization, relying on your state Highways Transport Committees to furnish the facts regarding essential highways transport activity with which they are intimately familiar and on which our state and local labor department officers may base their necessary orders.

We are therefore transmitting instructions to our representatives, advising them that all matters touching or in any way affecting highways transport operations are to be dealt with on the advice of your organization.

Secretary Hargreaves states in connection with the above that the policy of the Highways Transport Committee will be to conserve and strengthen every element of highways transportation, and to so direct it as to serve those industries which vitally aid in accomplishing the war program, as indicated from time to time by the War Industries Board.

Red Cross Appeals for Overseas Drivers

The American Red Cross is making appeal to men with automobile experience for service abroad and in its statement sets forth the fact that this is an opportunity for men who are not in class one or who are over draft age to serve their nation and all humanity as sincerely and as honorably as they would were they under the colors and in the first line on the field.

This appeal is made in behalf of the Automotive and Mechanical Section of the American Red Cross, a department recently created under the direction of Major H. P. Harding, to obtain the service of 1500 men who have some mechanical knowledge to drive trucks and ambulances overseas. The statement of the conditions and requirements are as follows:

"A course of three to five weeks will be given in the training camp located in Chicago, comprising military discipline and mechanical schooling. Immediate entainment for overseas duty will follow completion of training.

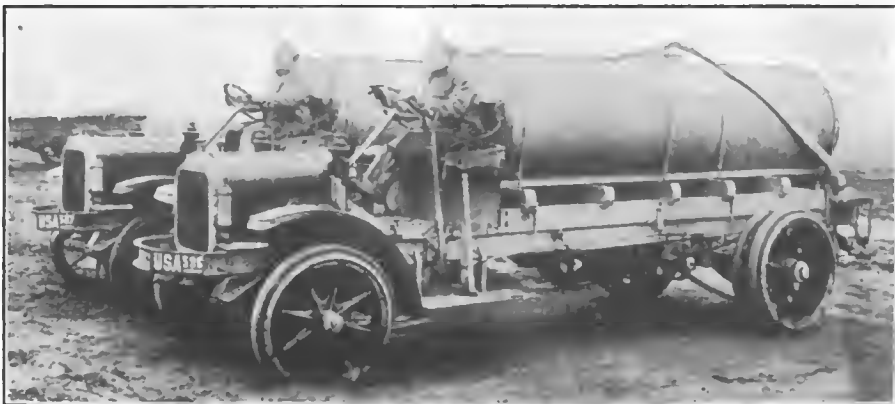
"Major Harding states that while mechanical training is helpful it is not absolutely necessary. The ambitious man who will knuckle down to hard work for a few weeks can acquire sufficient knowledge to efficiently perform his duties if he can now drive a car.

"Special appeal is directed to garage and repair men, dealers and all men in the automobile industry.

"Monthly allowance and maintenance will be paid after date of sailing; half pay and maintenance while in training.

"It is very likely that this quota will be quickly filled and it is suggested that those desiring to get into this branch of the service get their applications in as early as possible.

"Headquarters are at room 528, People's Gas building, Chicago, Ill., where inquiries can be made and where further information will be supplied to all who are interested in this work."



To Minimize the Dust Storms at One Army Cantonment in Kansas More Than 30 Miles of Highway Are Watered with Tanks Mounted on White Three-Ton Chassis. Two of Which Are Shown.

ACREMETER MEASURES FIELD WORK

CONDITIONS that were never before experienced have resulted from the activities of state and other organizations seeking to stimulate the production of large crops, especially since most of the states and municipalities, and perhaps private individuals, have purchased tractors and undertaken plowing, harrowing, cultivating and other agricultural operations for those who could not work their land to even normal productivity without assistance.

For instance, most of the states have bought tractors and plows and other necessary implements and have made contracts to plow and do other work, the prices charged being the estimated cost an acre, without profit. Owners of tractors have made contracts to do work for farmers practically on the same basis. These prices have varied, but may be

ally accepted and this will probably be preferred until established facts prove that this is not as reasonable or as equitable as the time basis.

In England the government has purchased large numbers of tractors and has made contract to do work on the basis of acres. In that country, even more than in America, the need has been cultivation of land, without regard to area or other condition that might ordinarily be considered, and expense has been secondary. But, nevertheless, there is no reason for disregarding prices charged or paid for work. In many instances fields are small and because of varying conditions, roughness, stones, banks, marsh and bogs and other obstacles, the entire areas could not be worked with the tractors, or, for that matter, with animals.

gree of dissatisfaction obtaining that was experienced in America. But without exception the officials have found the only satisfactory manner of determining prices for work has been to measure the work done in each field, often measuring each furrow.

An English inventor has developed and perfected an instrument known as an acremeter, which in general results obtained affords very reasonable data, which can be attached to any implement that is drawn, either by animals or power. It somewhat resembles a speedometer in its manner of indicating, being a train of gears and star wheels operated by a drawn wheel. It is a very practical instrument and has been found by experience to be reasonably accurate. There is no doubt that it saves time and if accepted as a means of officially recording work it is fair to all interested.

The acremeter is fitted with two star wheels for plowing, the one being in use and the other idle, representing two, three, four or six furrows. By removing a nut and taking off the outer star wheel and changing it for the inner, alternation is obtained for multiple furrow registration. The instrument is fitted with two trips, one of which is used to register for two and three furrows and two trips for three and six furrows. The meter is bolted to the plow and is connected to the lifting mechanism on the beam of the plow. When the plow is lifted off the ground the instrument is stopped. The meter, like a speedometer register, is read in tenths of acres, and it can be fitted to corn drills, binders, mowing machines, or, in fact, to any implement that is drawn on the ground, and being connected to the lifting gear it is in every way adjustable. As stated, it will register from one nine-inch furrow up to six furrows, either nine or 10 inches wide, and for other implements it will register for a width of six feet by a simple change that can be made in five minutes' time. As the acremeter only registers when in contact with the ground, it is maintained to be entirely automatic and entirely dependable. It can be fitted to any type of plow and probably adapted for any implement.

In use, a reading of the indicating dial is made before work is done, the owner of the land or his representative signing a ticket on which the reading is written. After the work is completed another reading is made and similarly recorded. As the record is in duplicate a copy is given the farmer and the other retained by the tractor driver. From these the price is established and the charge made. Incidentally the acremeter can be used for animal work. The cost of the instrument is said to be moderate and the service life is very long. An accompanying illustration shows the instrument attached to the rear of a plow drawn by a tractor. There is no doubt that such a registering device would be found equally serviceable in this country.



Acremeter Shown Attached Behind the Gang Plow, an English Instrument, Designed to Record the Work Done by Either Tractor or Animal Drawn Implements.

said to range from \$3.50 to \$6 an acre for plowing, and from \$1.50 to \$3 an acre for harrowing, with other work on similar basis.

Very rarely is the area of a field known exactly, and even then there is no way of determining the value of work done save by measuring, which requires time and adds to the cost. If farm land were surveyed and plotted so that when a work was completed a few simple measurements would afford all the information for fixing the price, the condition would be exceedingly simplified.

Experience has shown that time required, at a definite price an hour for the work of tractors, the prices based on the actual operating cost plus a reasonable allowance for profit, would be the most equitable, because of the fact that there will be lost time that is not considered in a charge on an acreage basis. But the price an acre has been very gener-

When the work had been completed the charges were often disputed by owners, who believed that they were overcharged, and there were numerous controversies that were simply the result of the uncertain knowledge of the areas that had been and had not been worked. In England, as in this country, the basis of work has been generally acreage, and the only manner of satisfactory adjustment was to measure the land after plowing, for instance, and this was found to add considerable to the expense. Because the agricultural operations in England are under the direction of a single body the uncertain and unsatisfactory acreage basis quickly received attention, because of its real importance.

In America, because each state department is operating independently of the other, and the conditions differ materially, there has not been the same de-

**TRACTOR COMPANY PROJECTED
FOR QUAKER CITY.**

Statement is made that a project has been launched at Philadelphia, which has not as yet assumed a tangible form, to organize a very large concern to manufacture farm tractors, with the view of selling machines on deferred payment plan. Those favorable to the proposal believe that with the very large demand for farm tractors and crop production stimulated to the highest degree, such a concern would be successful.

The proposition comprehends organizing a corporation with \$20,000,000, and statement is made that five men prominent as bankers in Philadelphia are willing to subscribe \$2,000,000 each, and there is belief that the other capital required could be obtained by sale of stock to the public generally. The plan of operating is to build tractors in large numbers, sell them as low as is possible with a reasonable margin of profit, and to finance the sale of machines to farmers whose local bankers will not accept their notes or other securities.

Those promoting the company are confident that with the use of tractors large areas of land that are now non-productive can be cultivated and that there will be substantial increase from crops that would not be practically possible unless the farmers could utilize machinery and power. The belief that there will continue to be a very acute shortage of labor for a long period is one reason for engaging in the manufacture of agricultural machines.

**BULL TRACTOR ABSORBS
MADISON CORPORATION.**

A consolidation of the Bull Tractor Co., Minneapolis, Minn., and the Madison Motors Corporation, has been effected under the name of the first mentioned company, and the purpose is to locate the plant at Anderson, Ind. The company is capitalized with \$1,500,000 preferred and \$1,200,000 common stock. The president of the company is Cecil Gibson, formerly president and general manager of the Madison Motors Corporation; the treasurer is L. A. Brown, and Frederick N. Judson and John F. Green, who controlled the Bull Tractor Co., are with Messrs. Gibson and Brown, the directors. The Madison Motors Corporation was organized in 1915.

WOLVERINE TRACTOR CO.

W. J. Wickes, Arnold Boutel and W. E. Laur of Saginaw, Mich.; C. A. Bigelow of Bay City, Mich.; W. E. Wood, W. G. Wagenhals and W. F. Austin of Detroit have been elected directors of the Wolverine Tractor Co., of Saginaw. The company has been capitalized for \$300,000, of which \$175,000 has been subscribed. Priority has been obtained on all tractor parts required and production will probably be begun early in September.

**ILLINOIS TRACTOR DEALERS FORM
ASSOCIATION.**

B. R. Butts is president, F. J. Sewigert secretary and Henry G. Garvey treasurer of the Central Illinois Tractor Dealers' Association, formed at Springfield, Ill. The object of the association is to stimulate cooperation between the different tractor agents and salesmen, to establish a basis of what is recognized as fair competition, to determine price and service problems and to bring about united endeavor in what is expected to be a productive sales campaign. The promoters of the organization have in prospect meetings at which agents, salesmen, factory representatives and others interested can discuss conditions and unite on policies that are expected to be advantageous to both the industry and the trade, as well as obtaining recognition from owners and prospective buyers of tractors.

**STERLING INSTRUCTION AND PARTS
BOOK.**

The Sterling Motor Truck Co., Milwaukee, Wis., has issued a new instruction and parts book that is one of the most comprehensive volumes of the kind ever produced by a manufacturer. The book consists of 144 pages and inserts and it is unusually well printed on a heavy paper and is bound with cloth and a solid board cover. The book deals with model B 3½ and five-ton trucks and it describes and illustrates practically every essential operation necessary for adjustment and repair of these machines. In addition all parts of the different construction units are specified and identified so that ordering of spares can be done without error. There is much valuable information contained in the book, which is instantly available through a very carefully compiled index. It is obtainable only through the company.

**GENERAL MOTORS VOTES BIG
STOCK INCREASE.**

The plan of the General Motors Corporation to increase the common stock from \$150,000,000 to \$200,000,000, and the preferred stock from \$50,000,000 to \$100,000,000, a total of \$100,000,000 has been approved by the stockholders, and statement is made that a part of the increase may be devoted to the acquisition of the United Motors Co., there being a proposition that one-tenth of General Motors common and three-tenths General Motors preferred be offered for each share of United Motors.

The stockholders also voted to distribute 10 per cent. of the net earnings each year to employees of General Motors subsidiary companies as a reward for their contribution to the success of the company. The distribution will be made from a fund equal to 10 per cent. of the net earnings after deducting six per cent. on the capital invested, the senior bonus list to include salaried workers receiving \$2400 a year or more, divided into five classes, according to merit, and the junior bonus list to include all employees receiving less than \$2400 a year, no employee to be placed on either list save by approval of the president, unless in the service of the company a year. There will be in addition a royalty bonus list, which will include employees rewarded for inventions, suggestions or ideas of special value to the corporation, each of which will be determined upon the merits of the proposition and will be made irrespective of the earnings of the company or the length of service of the employee, the measure being the value derived by the company by the use of the invention, idea or suggestion.

The Fulton Motor Truck Co., Farmingdale, L. I., has appointed F. C. Forbes, who has been a general traveling representative for about a year, assistant sales manager.



Mack 5½-Ton Truck Operated by the White River Spruce Co., Operating in Washington, Which Hauls from 25,000 to 30,000 Feet of Timber Each Day for Government Purposes.

NEW INTERNATIONAL MOTOR TRUCK CATALOGUE.

A catalogue that must be specially interesting to truck owners and users has just been issued by the International Harvester Co., builder of International trucks. It is a book that will have especial value for reference, for very rarely is it possible to obtain so comprehensive illustrations of body equipment as is presented in this publication. No less than 125 pages, each carrying three body types, are devoted to illustrating the different forms of equipment that may be adaptable to the needs of owners or buyers, and these are carefully indexed so that any business may be identified.

Besides this information the book contains specifications of the different sizes of machines built and description of the engines and power transmission system. This company constructs its own units, both power plants and internal gear rear axles, and these are illustrated and described. The book is printed in colors and typographically is unusually attractive.

WILL SELL NASH TRUCKS.

The Nash-Buffalo Corporation has been organized at Buffalo, N. Y., headed by C. B. Warren, well known as the executive of the Warren-Nash Motors Co. of New York City, which will distribute Nash trucks and cars in New York state west of Watertown. The vice president and general manager of the company is Spencer F. Swain, who was with the Warren-Nash Motors Co. as sales manager. The organization of the Buffalo company gives the interests represented by Mr. Warren control of the Nash sales in New York state. Mr. Warren is widely known in the industry and trade. For a number of years he was head of the New York City branch of the General Motors Co. and directed the sales and distribution of trucks in the territory served by that division. The Nash-Buffalo Corporation is now organizing its selling staff and making contracts with dealers in various commercial centers.

INCREASED ITS CAPITAL.

The Continental Auto Parts Co., Knightstown, Ind., has increased its capital from \$10,000 to \$50,000 and is now making extensive additions to its plant and equipment to produce government orders. The company manufactures shop and factory equipment, and specializes the Continental motor stand, which is used in large numbers by the different army, navy and aircraft departments of the United States, and by manufacturers producing airplanes, trucks, and tractors for all branches of the government service.

E. Dudley Fain has associated himself with the Dependable Truck and Tractor Co., Galesburg, Ill., as engineer. He resigned a similar connection with the Pan-American Motors Corporation, Decatur, Ill., to accept the position.

SAVIDGE UNIVERSAL BENCH VALVE LATHE.

A tool that may be made very useful either in the private garage or the service station is the Savidge Universal Bench Valve Lathe, designed to true the face of any valve, so that it may seat in the valve port. The tool consists essen-



The Savidge Universal Bench Valve Lathe Set for Cutting.

tially of a base to clamp in a vise, on which is a stem way for the valve, and mounted above this is a high speed steel cutter that may be set for any desired angle. The valve is placed in the way with a spring to maintain its position, and a handle is clamped to the stem end and turned. The cutter and the valve are adjusted by feed screws, and any cut can be had with surprising little labor, while the work is absolutely accurate. The tool can be used for any valve with 30 or 45 degrees angle faces up to $2\frac{1}{2}$ inches diameter and $7/16$ inch stems.

The Savidge Junior Valve Lathe is intended for use with valves for Ford chas-



Savidge Junior Valve Lathe for Small Engine Valves.

sis, having $5/16$ inch stems and cast iron valve heads, up to $1\frac{1}{4}$ inches diameter and with faces 45 degrees angle. Statement is made that this can be operated while held in the hand or clamped in a vise. The operation is practically the same as the Universal tool, but the cutter is fixed and is not fed for the cut. The adjustments are equally accurate and the work is quite as well done. The tool is a size that it may be carried in the kit of the truck or car.

A. E. HILDEBRAND JOINS CAMPBELL-EWALD STAFF.

Whether or not A. E. Hildebrand, who has been general manager of the National Tractor Farming Demonstrations ever since these events were organized in 1913 by the Tractor Demonstration Committee of the National Tractor and Thresher Manufacturer's Auxiliary to the National Vehicle and Implement Association, will again direct an exhibition of this character is uncertain.

Directly following the conclusion of the Salina, Kan., event he became associated with the Campbell-Ewald Co., Detroit, Mich., advertising agency, and will serve as advisor to clients engaged in any industry allied with agricultural operations. He will be connected with the Chicago office of the company and his activities may be in part of the country.

Mr. Hildebrand was for many years a resident of Bloomington, Ill., and recently was associated with the Twentieth Century Farmer of Omaha, Neb. Because of his management of the demonstrations he probably has the friendship of more men engaged in the tractor and implement industries than any other American, and he is very widely known to farmers, with whom he is regarded as an authority on farm operations and farm machinery.

GARY TRUCK CO. EXPANSION.

With the increase of the capital of the Gary Motor Truck Co., Gary, Ind., from \$175,000 to \$1,000,000, the company has perfected plans for additions to its plant that will increase the production from 500 to 1500 trucks annually. The stock issue has been underwritten by Hosick, Crawford & Co., Chicago. The personnel of the officers is not changed. W. H. O'Donnell is president and chairman of the board of directors. L. A. O'Donnell vice president and treasurer. C. W. Cole is vice president in charge of sales. L. W. Nichols is secretary in charge of manufacturing. C. V. Ridgely is general counsel and these, with A. M. Fisher of Gary and W. M. Albee of Detroit, the latter in charge of sales promotion, constitute the board of directors.

WHITSON MADE SALES MANAGER.

The Panhard Motors Corporation, Grand Haven, Mich., builder of Panhard trucks, has appointed C. W. Whitson, formerly connected with the Fulton Motor Truck Co., Farmingdale, L. I., its general sales manager. Mr. Whitson, who recently resigned from the Fulton company, is widely known in the industry and trade.

A distributors' contract has been made by the Kelly-Springfield Motor Truck Co., Springfield, O., with Thomas H. Hayes, Inc., of Chicago, for the states of Illinois, Iowa, Michigan, Indiana and Wisconsin. H. S. Dunlavy has been made manager of the truck department of the company.

CANADIAN TRACTOR TRIALS AT OTTAWA OCT. 16-18.

At Ottawa, Ontario, will take place Oct. 16-18 what has been organized as the "International Plowing Match, Tractor and Farm Machinery Demonstration," which will, if the plans are realized, be the most pretentious event of the kind ever seen in Canada. This will be in the nature of a competition of tractors with differing power machines for farming, and there will be prizes offered that will be very attractive both to individual owners and to manufacturers. Invitations have or will be extended to all American tractor and farm machinery manufacturers to take part, and there will be a series of owners' competitions, which are expected to be productive of much interest.

The event will take place at the experimental farm of Ontario, and the Booth farm adjoining, which will give upwards of 175 acres of land surface for working, and the Ontario Department of Agriculture is cooperating with the Ontario Plowmen's Association and other bodies in the arrangements. The plans are making in charge of a committee consisting of D. D. Gray of the Ontario Experimental Farm, F. C. Nunnick of the Conservation Commission, William Hodgkins of Shawville, W. L. Chauvin of Angers, P. Q.; Stewart McClenaghan of the Ottawa Board of Trade, R. B. Faith of the Ottawa Farm Journal and a representative of the Ottawa city council. R. B. Faith is executive secretary of the committee.

Ottawa has contributed \$500, Carleton and Leeds counties \$100 each, and other counties and organizations are expected to add to the fund to defray organization and conduct. A silver cup to be offered for the best plowman in eastern Ontario has been offered by the Ottawa Farm Journal. There will be an exhibition of all kinds of farm machinery, operative and idle, on the experimental farm. The competitions will be for animal and tractor plowing in different classifications, and the main contests will be between operators of tractors representing owners and manufacturers. The owners' classes will be represented by experts, for the Ontario Department of Agriculture will hold county plowing matches previous to the Ottawa event, under direction of its representatives, and the winners will be the entrants against the men who will drive for the tractor manufacturers.

REDFIELD ON PRIORITIES BOARD.

Secretary of Commerce William G. Redfield has been appointed a member of the Priorities Committee of the War Industries Board.

SAXON GETS TRUCK ORDER.

A government order for the Class AA type one-ton truck has been placed with the Saxon Motor Car Corporation of Detroit.

What Is Tractor Service?

By William Anwyl Jones, Advertising Manager, La Crosse Tractor Co., La Crosse, Wis.

WE HEAR a good deal nowadays about "Tractor Service," although up to a comparatively recent date tractors have been largely in the experimental stage. There has been too little attention paid to this necessary accompaniment of the business. The demand has been so keen that many manufacturers have been inclined to cater merely to the original demand, and pay little or no attention to the fact that even the best made machines will wear out or break through excessive strain.

It is essential for any tractor concern that hopes to gain and maintain its reputation in the trade, to arrange to have its distributors and dealers carry ample stocks of repairs where they can be secured on short notice in case of emergency. Every dealer who handles tractors should also carry a stock of those parts that naturally require replacing oftenest, sufficient to care for the tractors he sells.

Tractor Should Be Built Right.

It is not fair for the purchaser of a tractor to expect his dealer or the manufacturers to run at his beck and call to care for troubles caused by his own ignorance or mistakes. The tractor should be built right in the first place, correctly assembled and inspected and should be carefully looked over by the dealer before it goes into the customer's hands. The dealer also should instruct the customer carefully as to the mechanism and handling of the tractor and implements which it is expected to pull. A careful study of the instruction book, which should be kept as a handy book to refer to continually, will aid the farmer to understand the machine.

In buying a tractor, of course, he should make it a point to insist on a machine of simple construction as well as correct design and accessibility of all parts. He should see that his machine is so designed that it will do the work

required on his farm to the best advantage. It should be as light as consistent, and so balanced that it will not dig into the ground when in soft places, and hence waste its power in propelling itself, which should be applied to pulling the implements it is designed to handle.

Each Must Share Responsibility.

The customer, of course, should expect the dealer or manufacturer to make good any material defects in the tractor, and to give him reasonable instruction as to its use. But he should not expect the dealer or manufacturer to stand for his carelessness in failing to oil the bearings or gears, keep the radiator and fuel tanks full, nuts tight, etc. Any carelessness of this sort is liable to cause serious trouble, but the owner of the tractor should by all means expect to pay for the results of his own failure to use ordinary common sense.

The tractor more and more is destined to play a large part in the operation of the modern farm, and considering the short time they have been in the field a number of makes have proved their practical value and their right to be considered indispensable to the farmers.

One of the chief troubles has been the tendency on the part of many farmers to overload them. Such overloading would kill a team of horses in short order, and it will surely break down any machine, no matter how well constructed, in the course of time.

NEW MODEL WILCOX TRUCK.

The H. E. Wilcox Motor Co., Minneapolis, Minn., is making a 2½-ton truck in place of a two-ton model which has been discontinued. The company's line of trucks now includes the following models: One, 1½, 2½, 3½ and five tons capacities.

A new factory is building at 4500-6 Ravenswood avenue, Chicago, Ill., for the George D. Bailey Co., which was formed about a year ago to market Bailey ball thrust bearings.

Federal Truck Used with a Semi-Trailer by the W. M. Wallace Lumber Co., Fayetteville, N. C.

ALL-AMERICAN ONE-TON TRUCK



The Rear End of the All-American Chassis, Showing the Heavy Spring Mounting and Torbenesen Drive Axle.

PRODUCTION on a large scale is planned by the All-American Truck Co., Chicago, builder of All-American trucks, which recently established itself in the industry. The All-American company has announced that it will not during the period of the war sell trucks not required for essential purposes; that all officials of the company and those included in its sales organization or employed for production, must be American citizens.

The company is headed by R. H. Spear, the president, who was organizer of the Scripps-Booth Co., Detroit, was connected with the Gramm-Bernstein Co., Lima, O., and identified with the activities of some of the principal industries in Detroit. The vice president, in charge of production, is Robert J. Sutton, formerly production manager for the Four Wheel Drive Auto Co., Clintonville, Wis., builder of F-W-D trucks, and who is well

known as an authority on efficiency and economic management. The treasurer is Glenn W. Barden, for five years secretary and treasurer of the Kelly-Springfield Motor Truck Co., Springfield, O., and regarded as an accountancy expert by professional accountants.

Officials of the Company.

Statement is made that the design for the All-American truck was constructed under the direction and personal supervision of Ralph W. Austin, chief engineer for the Gramm-Bernstein Motor Truck Co., one of the engineers who collaborated in designing the chassis of the class B United States army truck.

The chassis was originally designed to be sold for a considerably higher price, but because of war conditions a number of changes have been made and the market value lessened, although quality was not sacrificed. The necessary changes in engineering were made by Robert G.

Filkington, who has been identified with the industry for nearly 20 years, and was the designer for the first Federal truck.

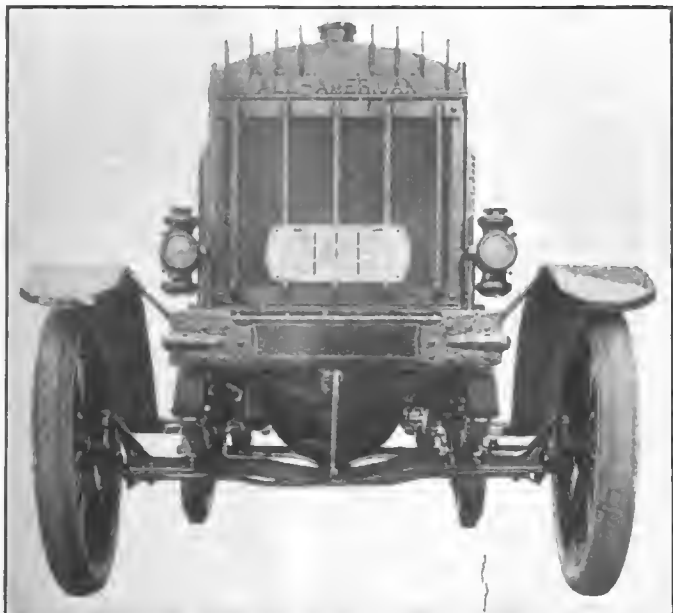
The plan of the All-American company was to standardize its design and produce this in large numbers, a policy justified from the viewpoint of manufacturing and service, for standardization of design means simplification of production and minimized cost of producing, and the maintenance of uniform quality of product. When but one type and size of truck is built the machine and tool equipment of the factory may be standardized, as well as patterns, templates, jigs and every manufacturing facility necessary. The expense is relatively smaller than were separate series of tools and equipment required for each size chassis built. The maintenance of uniform quality is insured by the use of construction units produced by specialists, who have developed these carefully to meet known service conditions and requirements, and who have perfected their products quite as much to insure their own enterprises as to afford to buyers a known value from varying aspects.

Large Production Planned.

The design of All-American trucks was determined for production in large volume—as high as 100 a day if hoped for conditions are realized. There is hardly a right or left part on the chassis. In other words, the spring brackets, motor supports, and various forgings and castings required for assembly serving a similar purpose are interchangeable. There is, for instance, a single master pattern for the foundry, for the drop forge shop, or for the part maker. The machine work is reduced from 25 to 50 per cent. or even more, and the number of tools, dies, jigs, etc., are minimized, lessening the investment and yet not



The All-American Chassis Equipped with a Rack Side Platform Body—The Driver's Compartment Has Doors and the Radiator Is Protected by a Front Frame Extension.



"Close-Up" of the Flanged-Tank Guard-Protected Radiator and Frame Extension of the All-American Chassis.

sacrificing quality. The manufacturing plan of the company for the next 12 months is to build 1500 chassis.

The company incorporates in its chassis a series of construction units built by well known concerns. The power plant is a Herschell-Spillman engine, the carburetor is a Zenith, the magneto a Dixie high-tension, the clutch a Borg & Beck, the transmission gearset a Grant-Lees, the driving shaft and universal joints a Detroit Universal Products Co. construction, the frame from the Detroit Pressed Steel Co., the rear axle from the Torben-son Axle Co. and the steering gear from the Ross Gear and Tool Co. The tire equipment is Republic pneumatic forward and Goodyear solid bands at the rear.

Engine a Special Type.

The power plant is mounted on three points in the chassis frame. This engine, the Spillman "4," was designed by E. O. Spillman especially for truck and tractor service. The engine is a four-cylinder, four-cycle, water cooled, vertical, L head type, with cylinder bore of $3\frac{1}{4}$ inches and stroke of five inches. While this is rated at 16.90 horsepower by the S. A. E. formula, which is 1000 feet of piston speed a minute, the claim is made by the manufacturer that the engine has developed 43 horsepower at 2300 revolutions a minute.

The engine is a two-journal type, with the cylinder block cast in two sections with the cylinders en bloc, the head being detachable. The cylinder block is cast from a high grade of semi-steel with the water jacket and the upper section of the crank case integral, and the head is a separate casting.

The head contains the combustion chambers and there are large water passages above and around them, and the outlet manifold is connected at the center of the block so that there is a flow over all of the cylinder heads. The spark plug bores are surrounded by the water chambers, this insuring cooling. The head is retained to the block by a

series of studs.

The cylinder block water jacket is considerably longer than the pistons and between the cylinders the jacket chambers extend to the bottoms, so that there is exceptionally large radiating area. The water enters the jacket at the lowest point and passes around the cylinders. The fuel inlet is cored in the block and the gas is heated to a point that will insure complete gassification and a better degree of ignition. The exhaust and fuel intake manifolds are cast as a single unit that is bolted to the block,

this greatly simplifying construction. The valves are surrounded by water chambers, which insures positive cooling.

The cylinder block under the valve pockets is cast with side and center webs which, with cover plates, enclose and fully protect the valve mechanism from abrasives, as well as insuring adequate lubrication. The upper half of the crank case is integral with the cylinder block, having a forward extension that houses the timing gearset and a rear extension that encloses the upper half of the flywheel. The rear extension also has cast with it the arms that support the power plant on the side frame members. The housings are adapted for the installation of a generator and a starting motor at the right side. The webs that carry the main bearings for the crankshaft are unusually heavy.

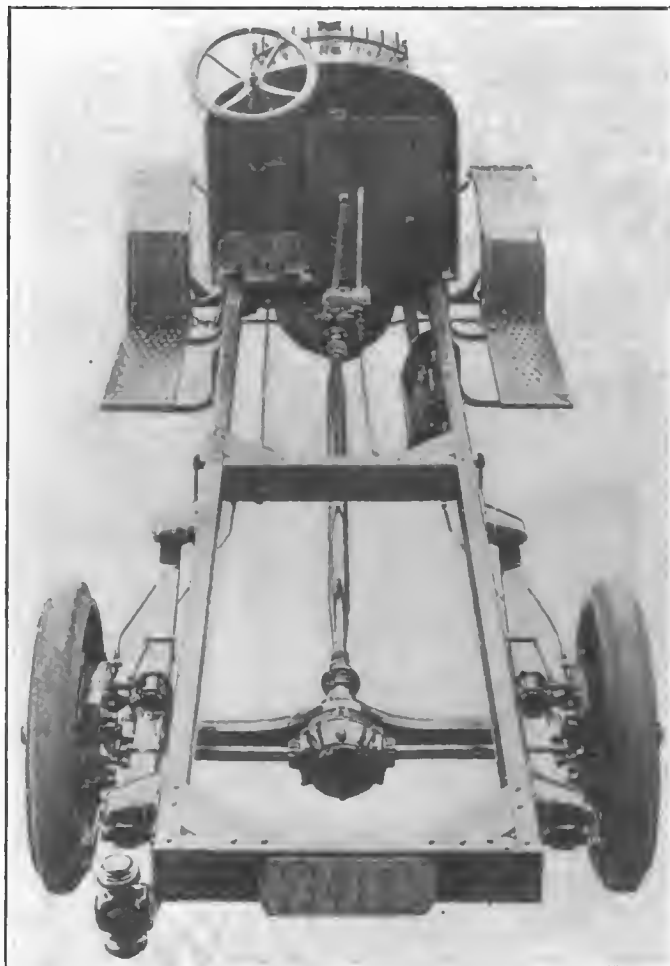
The lower section of the crank case is pressed steel, and this has extensions at the front and rear that complete the housings for the timing gearset and the flywheel. The lower part of this section forms the oil reservoir, and this is

separated from the crank chamber by a pressed steel plate in which are the oil troughs and perforations for drainage of the lubricant to the reservoir. The lower part of the housing is easily removable for examination of or work on the interior of the engine.

The cylinders are carefully tested to detect defects and after being rough bored are aged, after which they are finish bored and ground. The pistons are cast from high grade gray iron and these are turned, then fully seasoned and ground to exact size. They are fitted with three $\frac{3}{16}$ -inch rings each, these being located well above the wristpins. The crankshaft is drop forged from 40-50 carbon steel with the flywheel flange integral and it is double heat treated and ground to size. The journals are two inches diameter and four inches length each, this giving a total bearing length of eight inches.

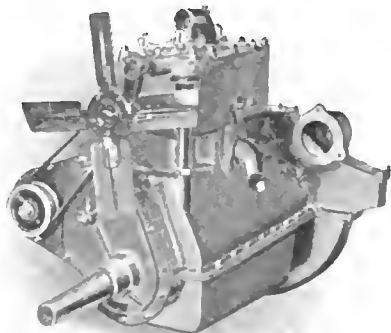
Details of the Engine.

The camshaft is drop forged from 15-20 carbon steel with the cams integral, and this is carried on three bearings. The shaft is rough machined, double heat treated, case hardened and accurately ground. The camshaft bearings from front to rear are respectively $2\frac{1}{2}$, $\frac{7}{8}$ and $2\frac{1}{8}$ inches length, and $2\frac{1}{16}$, $2\frac{1}{32}$ and $1\frac{1}{8}$ inches diameter. The connecting rods are I section, 40-50 carbon steel drop forgings, 11 inches length between centers, with big end caps that are retained by two nickel steel bolts each. The wristpins are steel tube, $\frac{7}{8}$



View of the All-American Chassis from the Rear, Showing the Rear Spring Mounting and the Power Transmission System.

inch diameter, case hardened and ground. These are secured in the piston bosses by set screws and pins, the connecting rods oscillating upon them.



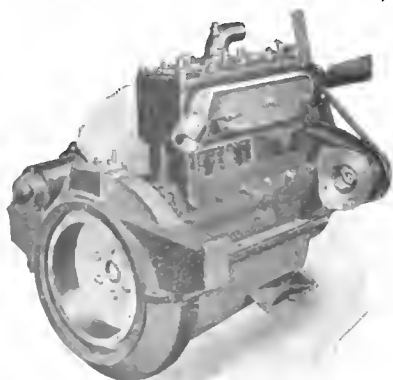
Front End and Left Side of the "Spillman 4" Engine of All-American Trucks.

The bearings for the crankshaft and crankpins are die cast babbitt, those of the camshaft are cast iron and those of the small ends of the connecting rods are phosphor bronze. The timing gearset is made upon three gears, those of the magneto and crankshaft being steel and that of the camshaft cast iron. These are helical cut and have wide faces. The valve ports are $1\frac{3}{4}$ inches diameter and have a lift of $5/16$ inch. The valves are nickel steel heads and stems, are interchangeable and operate in long guides in the cylinder block. The valves are operated by mush room type tappets mounted in cast iron guides, that are fitted with adjusting screws and nuts.

Cooling and Oiling Systems.

The engine is cooled by a thermo-syphon circulation of water through the cylinder jackets and a large cellular type radiator, with cast top and bottom tanks, the top tank being heavily finned to promote radiation. The air circulation is by a 16-inch fan mounted on a ball bearing on an adjustable bracket on the forward end of the cylinder block, that is driven by a flat belt from a pulley on the magneto shaft.

The engine is lubricated by a combination pressure feed and splash system. The oil is drawn from the reservoir in the base of the engine case by a pump driven by a skew gear at the rear end of the camshaft and carried to the main and camshaft bearings through tube, and there is an extension of this tube, in



Rear End and Right Side of the "Spillman 4" Engine. Showing the Twinned Manifold.

which there is an adjustable valve, that supplies the timing gearset. The valve opens when a predetermined pressure is attained, and the excess oil is drained to the gearset. When the pressure is reduced the valve closes automatically. The pump supplies oil to the troughs in the base of the crank chamber, into which the big ends of the connecting rods sweep, and which lubricates the cylinders, pistons, wristpins, cams and valve tappets.

The engine is equipped with a Zenith carburetor and a Dixie high-tension magneto with a fixed spark. Should the buyer desire an electric starting and lighting system the engine is designed so that these can be installed without changes.

Power Transmission System.

The Borg & Beck dry plate clutch is assembled in combination with a Grantless selective sliding gear transmission gearset, and is enclosed in a housing bolted to the flywheel case. The clutch consists of a plate slidable on the clutch shaft, that operates without lubricant and is easily adjustable, so that comparatively little attention is required. The gearset is a selective type, having three forward speed ratios and reverse, that is designed for truck service, having large shafts and wide faced gears, the shafts being mounted on anti-friction bearings.

The power is transmitted by a tubular shaft with swaged ends, made by the Detroit Universal Products Co., with a telescopic type of ball universal joint at either end. These joints are claimed to have exceptional efficiency and to minimize power loss. The rear end of the shaft is coupled to the pinion shaft of the Torbensen internal gear drive axle, type "Ox-2," which is rated as having 2700 pounds capacity on the spring pads. The axle consists of the I section, with nickel steel spindles that carries the load, and the countershaft, the housing of which is bolted to the center of the dead axle, with the ends mounted in the brake flanges. The differential gearset is a bevel gear type and the drive from this is through spur pinions on the ends of the shafts that mesh with internal ring gears mounted on the wheel hubs. The construction is the standard Torbensen drive, the countershaft being forward of the dead axle.

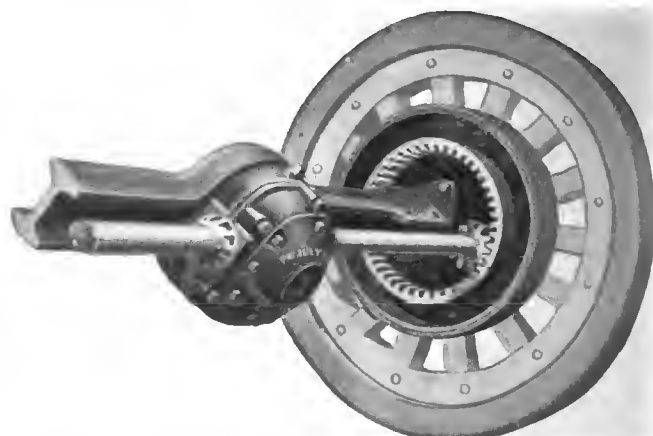
Frame and Other Chassis Details.

The frame is a pressed steel channel section, five inches width, with webs two inches wide, of $5/32$ inch material, that is constructed with heavy cross members and reinforced with gusset plates, and the ends are fitted with very large corner brackets that make the unit exceptionally rigid. This is mounted on semi-elliptic springs, the rear set outside of

the chassis frame. The forward set is 38 inches long and two inches wide, and the rear set 54 inches long and $2\frac{1}{2}$ inches wide. The main leaves are electro-silico-manganese steel and the others are carbon steel. The drive is the Hotchkiss design, through the springs, there being no radius rods.

The front axle is an I section steel drop forging with large steering knuckles. The wheelbase is 130 inches and the tread is 56 inches. The wheels are wood, artillery type, 12 spokes, $1\frac{3}{4}$ inch spokes forward and $1\frac{1}{2}$ inch spokes rear. These are shod with Republic 33 by 4-inch pneumatic tires forward and Goodyear 32 by 4-inch solid band tires rear.

The steering gear is a Ross construction, a fore and aft type, fitted with an 18-inch hand wheel, at the left side of the chassis. The control is by the conventional foot pedals for the clutch and service brake, a foot accelerator and gear shifting and emergency brake levers at the center of the floorboard. The brakes operate in and on drums on the rear wheels, the service brake being internal expanding and the emergency



Section of Torbensen Axle with Brake Flange Eliminated to Show the Position of the Internal Gear and Driving Pinion.

brake external contracting.

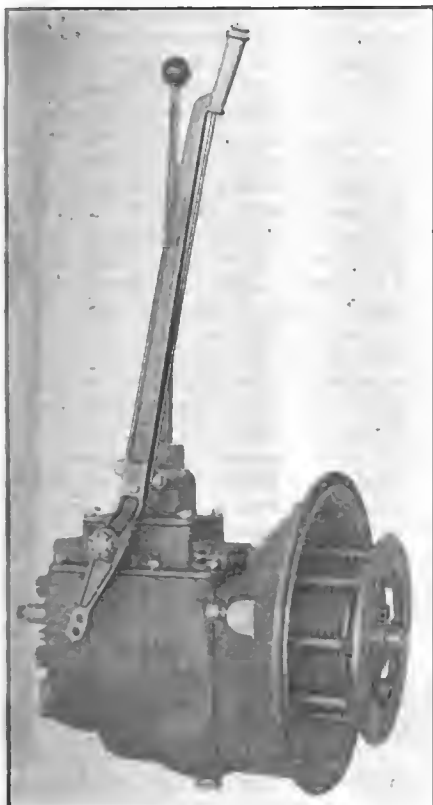
The chassis are equipped with a cushioned driver's seat, front fenders and running boards, oil dash and tail lamps, a warning signal, jack, tire repair kit and tools.

The design is such that 70 per cent. of the load is carried on the rear axle, so there is ample reserve for the weight of the body and capacity freight.

NEW STEEL WHEEL PROMISED.

The Jaxon Steel Products Co., Detroit, Mich., has appointed E. E. Foote, for a considerable time connected with it, sales manager of the wheel division, which has been established in headquarters at 3066 West Grand boulevard. No statement has been made relative to what the product of the wheel division will be other than it will be a decided surprise to manufacturers. President Clarence M. Day of the company states that the wheel has qualities that justify the large expenditure being made in preparation for producing it, and there is reason to believe that it will be approved by engineers and manufacturing men alike.

FULLER TRANSMISSION UNITS

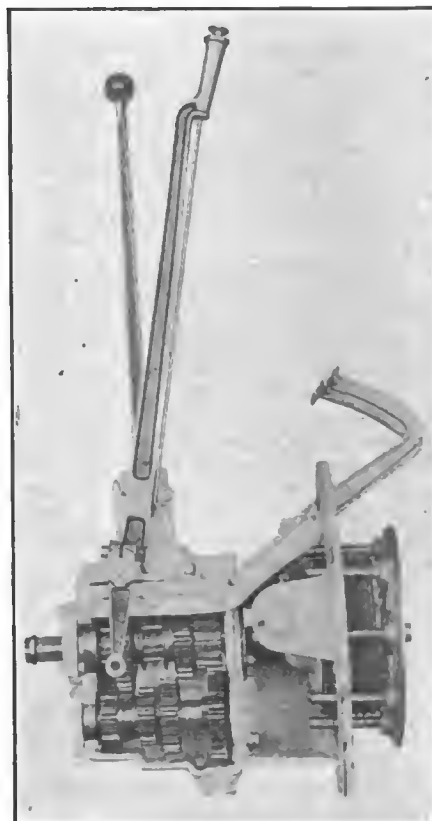


Fuller Model GU Transmission-Unit Power Type.

transmission gearsets, built in four sizes—model GU, for four-cylinder engines up to 350 cubic inches piston displacement, having four forward speed ratios, for trucks from $1\frac{1}{2}$ to $3\frac{1}{2}$ tons load capacity, or tractors rated from three to four plows; model TR-2, for four-cylinder engines up to 326 cubic inches piston displacement, having three forward speed ratios, for tractors rated from two to three plows; model TU-3, for four-cylinder engines up to 294 cubic inches piston displacement, having three forward speed ratios, for trucks from one to two tons load capacity, and model TU-4, for four-cylinder engines up to 227 cubic inches piston displacement, for trucks from $\frac{3}{4}$ to $1\frac{1}{2}$ tons load capacity. The model G transmission gearset, designed for amidship mounting, for four-cylinder engines having piston displacement up to 350 cubic inches, for trucks from $1\frac{1}{2}$ to $3\frac{1}{2}$ tons load rating, has four forward speed ratios. With this unit is used clutch model GCL and control set model GC. Model GCL clutch and GC control set are identical with the combination model GU clutch and control, designed for individual mounting.

Statement is made that these units are designed for carrying a heavy power overload and having extreme endurance in service. One quality of the clutches, for instance, is that they are non-adjustable, that they automatically compensate wear, and the only necessary adjustment is the position of the clutch pedal, so that it may be convenient for operation. For this reason they require practically no attention.

The clutch plates, if dry, are faced with the highest grade wire-asbestos facing, made specially for the company, which is claimed to have unusual wearing qualities and endurance. The clutches are operated by a single bearing, the construction being so designed that adjustment is automatic. This bearing is the only part that needs lubrication. If the clutch is operated in oil the

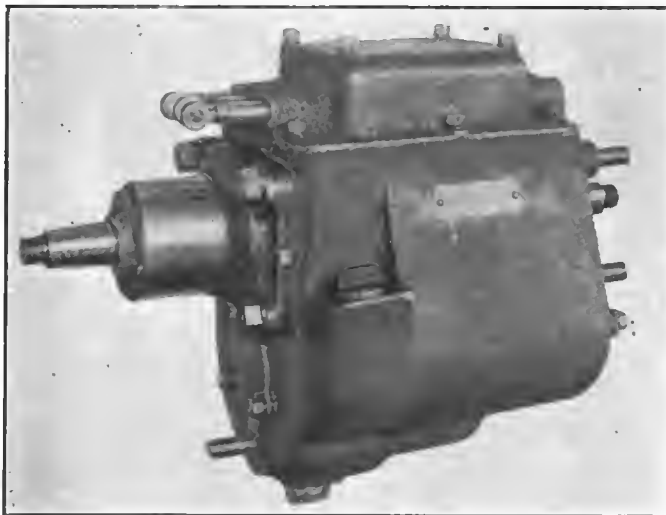


Cross Section of Fuller Model TU-3 Transmission-Unit Power Type.

plates are steel discs not faced.

The transmission gearsets have practically the same characteristics of design, the shafts being a special chrome nickel steel, carefully heat treated, and the gears are $3\frac{1}{2}$ per cent. cross rolled nickel steel, heat treated and hardened. Both the shafts and gears are large, the former being four-spline types, $1\frac{1}{2}$ inches over the keys, and the gears have wide faces. Throughout the construction annular ball bearings are used, which are non-adjustable and have capacity to resist any thrust that may develop with a large factor of safety.

The cases are cast from a high quality gray iron, and special care is taken to obtain parallelism of the shafts and to so locate them that the gears engage on the pitch line, which insures long endurance. The gears are shifted through a drop forged lever controlled by an automatic interlock that prevents two sliding gears being engaged at one time. The shifting is easy and positive and the lever travel distance is very small. The four speed transmissions are provided with extended countershafts for power take-offs, but this is extra equipment in the three speed types.



Fuller Model G Transmission. Four Forward Speed Ratios, Designed for Amidship Mounting.

PRODUCTION of transmission gearsets and power transmission clutches and control sets for operating them is specialized by the Fuller & Sons Manufacturing Co., Kalamazoo, Mich., a concern widely known in the industry, and Fuller units are recognized as standard by authoritative engineers. The company has been operating for upwards of 15 years and it has attained large proportions, having a large and finely equipped plant and facilities for manufacturing that are unexcelled.

The Fuller clutches are in two types, the one used with an independent transmission gearset and the other for combination with a gearset and an engine in a unit power plant. The same classification may be applied to the transmission gearsets. Both types are built in different sizes to meet power requirements. The clutches are multiple disc construction, either dry plate or lubricated plate. The transmission gearsets are all selective sliding gear types, either three or four forward speed ratios and reverse. The control sets are necessarily combined with some of the units, but others are designed for operating transmission gearsets independent of the power plants.

The unit power type consists of combined clutch and

TEACHING TRUCK DRIVERS VEHICLE ECONOMY

Teaching truck drivers vehicle economy has been inaugurated in a practical way by the General Motors Truck Co. at Chicago, the success of a meeting in May being such that a second was held this month, that seemingly is the forerunner of similar endeavor wherever the company has representation in the country.

The idea originated with E. J. Kilborn, manager of the GMC branch at Chicago, and the purpose was to interest truck drivers in conservation wherever this was possible in their work, with reference to time of vehicles, operating costs and maintenance. One reason that prompted the project was the constantly increasing shortage of labor in factories and service stations, especially of experienced men, and that practically all organizations are overworked to meet the actual requirements.

Mr. Kilborn believed that if the drivers could be interested in caring for the trucks they drive, doing some work that is now done at service stations and garages, and if they could be taught the best and most practical methods for doing whatever work is necessary to keep the machines adjusted and lubricated, the demands on the service stations would be decreased, and the maintenance cost to the owners would be reduced. Naturally the trucks would be in better operating condition and decidedly more efficient and economical.

Though the meeting was largely an experiment, the interest of drivers was manifested by an attendance of upward of 100, and there was no promise of anything other than practical talk with men interested in informing them.

The meeting was first addressed by Lieut. Martin of the Chicago police traffic squad, who explained interestingly how accidents might be averted and traffic expedited by compliance with the traffic ordinances of the city. Then came an address by A. C. Stevens, a Y. M. C. A. secretary, just returned from the western battle front in France, who was with the American forces when the first offensive was begun by Gen. Foch, who

told of the work done with trucks in army service.

H. N. Keating, district superintendent of the Standard Oil Co., told some very well thought out information of the damage resultant from overloading trucks, and some very practical advice was given by W. C. Dempsey, superintendent of the motor truck equipment for Morris & Co.

A semi-technical talk was made by Chief Engineer F. A. Whitten of the General Motors Truck Co., who dealt to a considerable extent with truck construction and explained how trucks could be driven and used to obtain the most economical results. He was followed by Service Manager H. L. Beckwith, who went more or less into details of adjustments of hearings, brakes and other operating parts that must be kept in good condition to compensate wear.

The last speaker was J. E. Baird, advertising manager for the General Motors Truck Co., whose subject was generally the driver and the part that he could do in obtaining truck operating conservation. He emphasized the need of economizing in the manner pointed out by previous speakers, and maintained that the truck driver who was careful took good care of his machine, saw that it was well adjusted, complied with traffic regulations, did not overload and conserved gasoline, could not only save greatly in time and money for his employer, but would no doubt realize substantial returns in highest wages and the best working conditions that were practically possible.

The talks of the speakers were illustrated by a truck chassis elevated on horses so that those desiring could walk under it without stooping, which afforded much better information than could be obtained from a truck standing on a floor. As a means of further amusing the drivers a clever sleight-of-hand entertainer did a series of surprising "stunts" and a buffet lunch was the finale to a very profitable evening.

WILL TACKLE HIGHWAY PROBLEMS TO HELP TRANSPORTATION.

Business men representing almost every section of the state recently held a meeting in Columbus under the auspices of the Highway Transportation Committee of Ohio for the purpose of taking up highway problems with the object of improving conditions for facilitating transportation, rural motor express and return loads bureau work.

A plan was adopted in accordance with the recommendations of the national committee, which consisted of a geographical division of the state to simplify the work. Five districts, with headquarters and divisional chairmen were named as follows:

No. 1—Toledo, Chairman Royal Scott, secretary of the Willys-Overland Co.

No. 2—Akron, Chairman S. V. Norton of the B. F. Goodrich Co.

No. 3—Columbus, Chairman I. N. Lightcap, district manager of the International Harvester Co.

No. 4—Cincinnati, Chairman W. I. Calderine, representing the Cincinnati Business Men's Association.

No. 5—Portsmouth, Chairman Mark W. Selby.

There will be six members on each district committee and after these are organized the various county organizations will be formed.

ARMY OF 1,500,000 REQUIRES OVER 40,000 TRUCKS.

The Motor Transport Corps recently issued some figures showing the requirements in machines and men to handle the transport of an army of 1,500,000. Motorized equipment for an army of this size carries a total personnel of 154,774 men, including non-commissioned officers, mechanics and others, and 40,803 army motor trucks. There are also 24,250 motorcycles, 7905 passenger automobiles and 6598 ambulances. To handle this vast equipment 273 service parks are used.

DETROIT TRANSPORTATION ASSO- CIATION FIXES RATES.

The Detroit Transportation Association has fixed a schedule of rates for the rental of trucks in that city, which has been agreed upon by all the members. The rates are as follows:

Stake bodies up to	Per Hour
1 ton.....	\$1.50
2 ton.....	1.75
3½ ton.....	2.00
5 ton.....	2.50
6½ ton.....	2.75
Dump bodies up to	
3½ ton.....	2.50
5 ton.....	2.75
6½ ton.....	3.00

PNEUMATIC TOOL CO.'S NEW PLANT.

The Chicago Pneumatic Tool Co. is erecting an addition to its plant, which will provide for an increase in manufacturing output of 100 per cent. The building will cost about \$150,000 and will be completed early in November.



A Semi-Trailer Adapted for Heavy Haulage with a Five-Ton Truck, the Equipment as Shown Being Utilized for Carrying Stone.

AUTOMOTIVE WHEEL MAKERS ORGANIZE.

The Association of Automotive Wheel Manufacturers has been organized by a number of makers of metal vehicle wheels for the purpose of promoting a better understanding among the members and to cooperate in presenting the various phases of this industry to the government or others should occasion arise. Research problems and standardization methods will also be considered.

The organization took tentative form at a meeting held in Toledo, at which a committee was appointed to carry out the necessary steps to make it permanent and formulate working plans. The committee is composed of the following three members: Mark Merriman of the Hayes Wheel Co., H. A. Coffin of the Detroit Pressed Steel Co. and George L. Lavery of the West Steel Castings Co.

The men present at the first meeting were: A. H. Anthony, Massillon Steel Casting Co.; Edward H. Webb, Dayton Steel Wheel Co.; George L. Lavery, West Steel Castings Co.; G. S. Porter, Hayes Wheel Co.; Mark Merriman, Hayes Wheel Co.; Ralph D. Webster, Wire Wheel Corporation of America; R. F. Filnterman, Michigan Steel Casting Co.; George Walther, Dayton Steel Foundry Co.; R. P. Flower, Standard Steel Casting Co.; A. L. Jelley, All-Steel Wheel Co.; W. E. Burns, Michigan Malleable Iron Co.

TRACTORS AT INDIANAPOLIS FAIR.

During the Indiana state fair at Indianapolis the first week of this month 25 different tractor manufacturers made displays of farm tractors and implements, which were demonstrated as well as exhibited. The exhibitors included the following makers:

Advance-Rumely Thresher Co., Laporte, Ind.; Aultman & Taylor Machinery Co., Mansfield, O.; Avery Co., Peoria, Ill.; Besser Manufacturing Co., Alpena, Mich.; Bull Tractor Co., Minneapolis, Minn.; J. I. Case Threshing Machine Co., Racine, Wis.; Cleveland Tractor Co., Cleveland, O.; Deere & Co., Waterloo, Ia.; Elgin Tractor Corporation, Piqua, O.; Emerson-Brantingham Co., Rockford, Ill.; Henry Ford & Son, Dearborn, Mich.; Huber Manufacturing Co., Marion, O.; International Harvester Co., Chicago, Ill.; Interstate Tractor Co., Waterloo, Ia.; La Crosse Tractor Co., La Crosse, Wis.; Midwest Engine Co., Indianapolis, Ind.; Moline Plow Co., Moline, Ill.; Ohio Manufacturing Co., Upper Sandusky, O.; Parrett Tractor Co., Chicago, Ill.; Port Huron Engine and Tractor Co., Port Huron, Mich.; Rock Island Plow Co., Rock Island, Ill.; The Russell & Co., Massillon, O.; Star Tractor Co., Findlay, O.; Turner Manufacturing Co., Port Washington, Wis.; Wallis Tractor Co., Racine, Wis.

The American Engine and Tractor Co., Charles City, Pa., has made contract with the Brehm-McMullen Co., distributor of Acme trucks at Minneapolis, Minn., to deliver 1300 American 15-30 tractors. This is a transaction of large proportions, as the American tractors were quoted in the contract as \$1895 each.

Automotive and Accessories Exposition a Success

Staged on the \$5,000,000 Municipal Pier at Chicago, beginning Sept. 14 and continuing to the 21st, the Automotive and Accessories Exposition was a decided success. It was stated to be the largest event of the kind ever organized in the West, and possibly in the country, and the purposes were such as to attract hundreds of thousands of visitors. The show was an exhibit of trucks, tractors and accessories, and it was conducted by the Automotive and Accessories Exhibition Co.

The management maintained that it was distinctly a war exhibition from the fact that only essential machinery needed to win the war was displayed. The exposition served to bring together the products of the automotive industry that are commercial necessities, that conserve man power, that facilitate transportation, that relieve railroad congestion and stimulate more intensive agriculture, and also to bring before the people the attitude of the automotive industry toward the government in whatever will contribute the successful prosecution of the war.

There were, of course, other aspects, such as broadening the means of distributing, creating interest in the construction and maintenance of public roads necessary for commercial, industrial and military activities, as well as developing the markets for products of the truck and tractor industries. Necessarily there was keen manifestation of patriotism, and this was supplied in part by the decorations, while through the different meetings, lectures and conventions there was an atmosphere of national solidarity that could but be elevating and inspiring.

The visitors to the pier saw stretching before them approximately a half mile of floor area given over to display of industrial machinery and products, with settings of the flags of America and her allies, and combinations of color effects, the spaces being defined by white and gold lattice work, with mammoth painting on canvas draped on the walls that depicted the progress of industrial life in America covering a period of about a century.

ARCADIA TRAILER BUYS BUILDING.

The Arcadia Trailer Corporation, Newark, N. J., has purchased three buildings, which will be used for manufacturing, storage and office purposes respectively. The company has also acquired a railroad siding 600 feet long on the New York Central railroad.

So far as known there will be no obstacle to the annual exhibition of the Kansas City Tractor Club at Kansas City, Mo., in February. This will probably be regarded as necessary for the promotion of the use of agricultural machinery and implements.

The displays were made by nearly 200 manufacturers, and besides the exhibits of trucks, ranging from the smallest to the largest, equipped with various types of bodies for widely differing purposes, there was an equally comprehensive department given over to farm tractors of all sizes and makes. The exhibition of body equipment for trucks was especially interesting. The department for agricultural implements was large and it attracted great numbers, for seemingly there was never so much interest in the production of food crops.

The accessories exhibits were seemingly numberless and these included tires, tire fillers, tire chains, speedometers, carburetors, piston rings, electric lighting and starting systems, engine governors, engines, spark plugs, lubricants, electric rectifiers and transformers, tools and automotive utilities of all kinds, that were displayed so as to attract the attention of those who were even indifferent to the general features of the spectacle.

The exposition was attended by thousands of farmers from Illinois, Wisconsin, Iowa, Michigan, Ohio, Indiana and other Middle West states, and there were conventions of threshermen and various classes of business men that ranged from one to several days, with programs of speaking and discussions of subjects of class and even national interest.

Statement is made that the exhibitors as a whole were very successful in making business connections, some of them adding materially to their organizations, while orders were extremely plentiful, many of them in large volume. In fact the actual transactions were surprisingly in excess of expectations.

The attendance was quite beyond what was anticipated, and there was supplementary entertainment for the visitors, for each evening a space was cleared and dancing was indulged in by large numbers. The management endeavored to make the exposition different from any exhibition ever held, and with the abundant space afforded by the municipal pier subsequent shows staged there will no doubt be extremely productive.

NEW DEPENDABLE PLANT.

The Dependable Truck and Tractor Co., Galesburg, Ill., has started work on its new plant, which is to be 100 by 30 feet and will be completed early in December. The company is manufacturing trucks in its temporary quarters at Galesburg.

John E. Powell and W. L. Rodrigues of Charleston, S. C., are the organizers of the Interstate Transport Co. of that city, which will deal in and operate automobile vehicles of all kinds and do a general transportation business.

TRUCK BUYING LIMITED TO 69 ESSENTIAL INDUSTRIES

War Industries Board's Preference List Basis for Industry and Trade for Selling, Employing Labor, Determining Employees' Draft Status and Purchase of Material for Construction.

POWER truck buying is limited to those engaged in 69 different industries specified as essential unless express permission is given by the Priorities Division of the Automotive Products Section of the War Industries Board. The War Industries Board has issued a preference list, which will undoubtedly be extended, which specifies upwards of 6000 concerns already regarded as approved truck buyers.

The National Automobile Chamber of Commerce has issued to its members and their sales representatives a circular entitled "Preferred List of Industries Issued by War Industries Board Is a Guide for Manufacturers of Trucks," which is signed by Alfred Reeves, general manager for the organization, and by its National Motor Truck Committee, of which George H. Graham is chairman and Windsor T. White, David Ludlam, David C. Fenner, Martin L. Pulcher and Samuel A. Miles are members.

The list of the War Industries Board is preceded by the following general statement, which indicates how the list may serve as a guide for selling trucks, employing labor, determining the draft status of employees and purchasing material.

To Motor Truck Manufacturers.

1. The War Industries Board has issued a preference list of industries. This list includes 69 industries and more than 6000 individual plants, which are being added to from time to time. (Circular No. 20. Preference List No. 2, Sept. 3, 1918.)

2. Among these individual plants are or will be listed the manufacturers of motor trucks who have filed pledges and applications for places on the preference list. Necessary employees of such companies will be considered in essential work.

3. Manufacturers of passenger cars are being handled in another manner by the War Industries Board. They are being given certain priority for certain materials to match up on their stocks of materials on hand under a curtailment program.

4. This list of 69 industries and more than 6000 individual plants in this pamphlet will be a guide for essential uses for trucks as agreed to with the War Industries Board. This list may be used as a basis, but where any question

arises as to the essential use of a truck the matter should be referred for definite ruling to the Automotive Products Section of the War Industries Board for submission to the Priorities Division.

5. If in any given case the use proposed to be made of a motor truck of your manufacture shall be one which has not been defined as essential by the Priorities Division, but which the proposed user conceives to be essential and of such importance that its sale to him should be permitted, then such proposed user may make a full statement of the facts in writing, under oath, to the manufacturer making such motor truck and apply to such manufacturer for his approval of the proposed use. Such manufacturer thereupon shall indorse upon the statement of facts his agreement with or disapproval of the same, giving his reasons therefor and transmitting the application and his indorsements thereon to the Automotive Products Section of the War Industries Board, Washington, D. C., for submission to the Priorities Division, and if approved by said division a permit will be issued for the sale of such motor truck to such proposed user.

6. This new preference list will not bind the district draft boards in allowing deferred classification under the draft law. Persons seeking deferred classification, whether they are employers or employees, will submit to the draft board whether they are so essential to industry that they should remain out of military service. The draft boards will determine what industries are necessary and what employees are necessary to the maintenance of such industries.

7. The real purpose of the master key preferential list of industries is not to operate as an embargo against other industries not named, but "to defer the requirements of all other industries and plants until those on the preferential list shall have been satisfied."

8. Industries have been grouped into four classes. The classes differ in degrees of necessity as vital elements in the prosecution of the war. The following list of industries are those which the War Industries Board holds should have preferential treatment. The 6000 individual plants cannot be included in this circular without making it unduly long.

A copy of the pamphlet has been mailed to you. It may also be seen in the custody of the draft boards or representatives of the U. S. Labor Employment Bureau in your city. (Circular No. 20—Preference List No. 2, issued Sept. 3, 1918.)

Classification of Industries.

NOTE—The term "principally" means 75 per cent. of the products mentioned.

AIRCRAFT—Plants engaged principally in manufacturing aircraft or aircraft supplies and equipment, Class 1.

AMMUNITION—Plants engaged principally in manufacturing same for the United States government and the Allies, Class 1.

ARMY AND NAVY—Arsenals and Navy Yards, Class 1.

ARMY AND NAVY—Cantonments and Camps, Class 1.

ARMS (Small)—Plants engaged principally in manufacturing same for the United States government and the Allies, Class 1.

BAGS—Hemp, jute and cotton, plants engaged principally in manufacturing same, Class 4.

BLAST FURNACES—(Producing pig iron), Class 2.

BOOTS AND SHOES—Plants engaged exclusively in manufacturing same, Class 4.

BRASS AND COPPER—Plants engaged principally in rolling and drawing copper, brass and other copper alloys in the form of sheets, rods, wire and tubes, Class 2.

CHAIN—Plants engaged principally in manufacturing iron and steel chain, Class 3.

CHEMICALS—Plants engaged principally in manufacturing chemicals for the production of military and naval explosives, ammunition and air craft, and use in chemical warfare, Class 1.

CHEMICALS—Plants not otherwise classified and listed, engaged principally in manufacturing chemicals, Class 4.

COKE—Plants engaged principally in producing metallurgical coke and byproducts, including toluol, Class 1.

COKE—Plants not otherwise classified and listed, producing same, Class 2.

Cotton Plants in Class 4.

COTTON—Plants engaged in the compression of cotton, Class 4.

CRANES—Plants engaged principally in manufacturing locomotive or traveling cranes, Class 2.

DOMESTIC CONSUMERS—Fuel and electric energy for residential consumption, including homes, apartment houses, residential flats, restaurants and hotels, Class 1.

DOMESTIC CONSUMERS—Fuel and electric energy not otherwise specifically listed, Class 2.

DRUGS—Medicines and medical and surgical supplies, plants engaged principally in manufacturing same, Class 4.

ELECTRICAL EQUIPMENT—Plants engaged principally in manufacturing same, Class 3.

EXPLOSIVES—Plants engaged principally in manufacturing same for military and naval purposes for the United States Government and the Allies, Class 1.

EXPLOSIVES—Plants not otherwise listed, engaged principally in manufacturing same, Class 3.

FARM IMPLEMENTS—Plants engaged principally in manufacturing agricultural implements and farm operating equipment, Class 4.

FEED—Plants engaged principally in preparing or manufacturing feed for live stock and poultry, Class 1.

FERRO ALLOYS—Plants engaged principally in producing ferro-chrome, ferromanganese, ferro-molybdenum, ferro-silicon, ferro-tungsten, ferro-uranium, ferro-vanadium and ferro-zirconium, Class 2.

FERTILIZERS—Plants engaged principally in producing same, Class 4.

FIRE BRICK—Plants engaged principally in manufacturing same, Class 4.

FOODS—Plants engaged principally in producing, milling, refining, preserving, refrigerating, wholesaling or storing food for human consumption, embraced within the following description: All cereals and cereal products, meats, including poultry, fish, vegetables, fruit, sugar, syrups, glucose, butter, eggs, cheese, milk and cream, lard, lard compounds, oleomargarine and other substitutes for butter or lard, vegetable oils, beans, salt, coffee, baking powder, soda and yeast, also ammonia for refrigeration, Class 1.

FOODS—Plants engaged principally in producing, milling, preparing, refining, preserving, refrigerating or storing food for human consumption not otherwise specifically listed. Excepting herefrom plants producing confectionery, soft drinks and chewing gum, Class 3.

FOOD CONTAINERS—Plants engaged principally in manufacturing same, Class 4.

FOUNDRIES—(Iron)—Plants engaged principally in the manufacture of gray iron and malleable iron castings, Class 4.

GUNS—(Large)—Plants engaged principally in manufacturing same for the United States Government and the Allies, Class 1.

HOSPITALS—See public institutions and buildings.

ICE—Plants engaged principally in manufacturing same, Class 3.

INSECTICIDES AND FUNGICIDES—Plants engaged principally in manufacturing same, Class 4.

LAUNDRIES—Class 4.

MACHINE TOOLS—Plants engaged principally in manufacturing same, Class 2.

MEDICINES—See drugs and medicines.

MINES—Coal, Class 1.

MINES—Producing metals and ferro-alloy minerals, Class 2.

MINES—Plants engaged principally in manufacturing mining tools or equipment, Class 3.

NEWSPAPERS AND PERIODICALS—Plants engaged principally in printing newspapers and periodicals which are entered at the postoffice as second class mail matter, Class 4.

OIL AND GAS—Plants engaged principally in producing oil or natural gas for fuel, or for mechanical purposes, including refining or manufacturing oil for fuel, or for mechanical purposes, Class 1.

OIL AND GAS—Pipe lines and pumping stations engaged in transportation of oil or natural gas, Class 1.

OIL AND GAS—Plants engaged principally in manufacturing equipment or supplies for producing or transporting oil or natural gas or for refining and manufacturing oil for fuel or for mechanical purposes, Class 3.

PUBLIC INSTITUTIONS AND BUILDINGS (Maintenance and Operation Of)—Other than hospitals and sanitariums, Class 3.

PUBLIC INSTITUTIONS AND BUILDINGS (Maintenance and Operation Of)—Used as hospitals or sanitariums, Class 1.

PUBLIC UTILITIES—Gas plants producing fuel, Class 1.

PUBLIC UTILITIES—Street railways, electric lighting and power companies,

gas plants not otherwise classified, telephone and telegraph companies, water supply companies and like general utilities, Class 2.

PUBLIC UTILITIES—Plants engaged principally in manufacturing equipment for railways or other public utilities, Class 2.

PULP AND PAPER—Plants engaged exclusively in manufacturing same, Class 4.

RAILWAYS—Operated by United States Railroad Administration, Class 1.

RAILWAYS—Not operated by United States Railroad Administration (excluding those operated as plant facilities), Class 2.

SHIPS—(Maintenance and Operation Of)—Excluding pleasure craft, not common carriers, Class 1.

SHIPS—Plants engaged principally in building ships, excluding (a) pleasure craft, not common carriers; (b) ships not built for the United States Government or the Allies nor under license from United States Shipping Board, Class 1.

SOAP—Plants engaged principally in manufacturing same, Class 4.

STEEL MAKING FURNACE—Plants engaged solely in manufacturing ingots and steel castings by the open hearth, Bessemer, crucible or electric furnace process, including blooming mills, billet mills and slabbing mills for same, Class 1.

STEEL PLATE MILLS—Class 1.

STEEL RAIL MILLS—Rolling rails

(50) or more pounds per yard, Class 2.

STEEL—All plants operating steel rolling and drawing mills exclusive of those taking higher classification, Class 3.

STURGICAL SUPPLIES—See drugs and medicines.

TANNERS—Plants engaged principally in tanning leather, Class 4.

TANNERS—Plants engaged principally in manufacturing, tanning extracts, Class 4.

TEXTILES—Plants engaged principally in manufacturing cotton textiles: including spinning, weaving and finishing, Class 4.

TEXTILES—Plants engaged principally in manufacturing woolen textiles, including spinners, topmakers and weavers, Class 4.

TEXTILES—Plants engaged principally in manufacturing cotton or woolen knit goods, Class 4.

TEXTILES—Plants engaged principally in manufacturing textile machinery, Class 4.

TIN PLATES—Plants engaged principally in manufacturing same, Class 3.

TOBACCO—Only for preserving, drying, curing, packing and storing same, not for manufacturing and marketing, Class 4.

TOLUOL—See coke, also Public Utilities.

TOOLS—Plants engaged principally in manufacturing small or hand tools for working wood or metal, Class 3.

TWINE—(Binder and Rope)—Plants engaged principally in manufacturing same, Class 4.

WAR AND NAVY DEPARTMENTS—Construction work conducted by either the War Department or the Navy Department of the United States in embarkation ports, harbors, fortified places, floor protection operations, docks, locks, channels, inland waterways and in the maintenance and repair of same, Class 2.

WIRE ROPE AND ROPE WIRE—Plants engaged principally in manufacturing same, Class 2.

WOOLEN TEXTILES—See textiles.

Preference Treatment List.

For the guidance of all governmental agencies in the production, supply and distribution of raw materials, finished products, electrical energy, fuel and transportation by rail, water, pipe lines and otherwise, the Priorities Board has adopted the following General Classification of Purposes demanding preference treatment: (Including all necessary raw materials, partially manufactured parts and supplies for completion of product.)

SHIPS—Including destroyers and submarine chasers.

AIRCRAFT, MUNITIONS, MILITARY AND NAVAL SUPPLIES AND OPERATIONS—Building construction for government needs. Equipment for same.

FUEL—Domestic consumption. Manufacturing necessities named herein.

FOOD AND COLLATERAL INDUSTRIES—Foodstuffs for human consumption and plants handling same. Feeding stuffs for domestic fowls and animals, and plants handling same. All tools, utensils, implements, machinery and equipment required for production, harvesting and distribution, milling, preparing, canning and refining foods and feeds such as seeds of foods and feeds, binder twine, etc. Products of collateral industries, such as fertilizers, fertilizer ingredients, insecticides and fungicides. Containers for foods and feeds, collateral products. Materials and equipment for preservation of foods and feeds, such as ammonia and other refrigeration supplies, including ice.

CLOTHING—For civilian population.

RAILROAD—Or other necessary transportation equipment, including water transportation.

PUBLIC UTILITIES—Serving war industries, Army, Navy and civilian population.

Other Essential Trades and Industries.

9. In addition Mr. Rhodes Baker of the Priorities Division of the War Industries Board, also has indicated his approval of the following industries and trades that come within the scope of what may be considered essential industries to which motor trucks may be sold:

Seeds.
Refrigeration.
Bridge builders.
Contractors—Building, road, paving, sand, gravel, cement, bridge, steel, garage.
Farm wagon manufacturers.
Public haulage companies.
Drayage concerns.
Transfer companies.
Casket manufacturers.
Cemeteries.
Department stores.
Elevator manufacturers.
Hardware manufacturers.
Heating and ventilating concerns.
Hotels.
Hotel supply manufacturers.
Linoleum manufacturers.
Plumber's supplies manufacturers.
Stove manufacturers.
Tent and awning manufacturers.
Tire manufacturers.
Typewriter manufacturers.
Warehouses.
Other Industries may be added later.
In a foreword to the list this statement is made:

"The President has placed upon the Chairman of the War Industries Board the responsibility for determining and administering all priorities in production and delivery.

"The determination of the relative importance of all industries and plants for both production and delivery by a single agency renders it possible to reasonably maintain a well balanced program with respect to the several factors entering into production, which include (a) plant facilities, (b) fuel supply or electric energy, or both, (c) supply of raw material and finished products, (d) labor, and (e) transportation by rail, water, pipe lines or otherwise. Without all of these—speaking generally—production is impossible.

"In compliance with the directions of the President that plans be formulated whereby there may be common, consistent and concerted action in carrying into effect all priority policies and decisions, the Chairman of the War Industries Board has created a Priorities Board, with the Priorities Commissioner of the War Industries Board as Chairman, consisting of (1) the Chairman of the War Industries Board, (2) the Priorities Commissioner, (3) a member of the Railroad Administration, (4) a member of the United States Shipping Board Emergency Fleet Corporation, (5) a member of the

War Trade Board, (6) a member of the Food Administration, (7) a member of the Fuel Administration, (8) a representative of the War Department, (9) a representative of the Navy Department, (10) a member of the Allied Purchasing Commission, and (11) the Chairman of the War Labor Policies Board.

Decisions Subject to Review.

"The decisions of the Priorities Board are subject to review only by the Chairman of the War Industries Board and by the President.

"For the guidance of all governmental agencies and all others interested in (1) the production and supply of fuel and electric energy, (2) in the supply of labor, and (3) in the supply of transportation service by rail, water, pipe lines or otherwise, in so far as such service contributes to production of finished products, the accompanying designated Preference List 2, has been adopted by the Priorities Board superseding Preference List 1, adopted April 6, 1918, and all amendments and supplements thereto.

"Where advisable, industries as such have been classified and listed. In numerous instances individual plants have been found to be entitled to preference, although the industries to which they belong are not; and in other instances where an industry as such has been accorded a degree of preference, particular plants in such industry have been placed in a higher class. This has necessitated classifying and listing not only industries as such, but to a limited extent individual plants, some of which are accorded a higher rating than that accorded the listed industry to which they belong.

"The preference list is made up of industries and plants which in the public interest are deemed entitled to preferential treatment. The inclusion of these industries and plants on this list does not operate as an embargo against all others, but the effect is to defer the requirements of all other industries and plants until the requirements of those on the preference list shall have been satisfied.

"In the compilation of this list industries and plants have been divided according to their relative importance into four classes, viz.: Class 1, Class 2, Class 3 and Class 4. In determining such relative importance consideration and weight have been given not solely to any one, but to all of the following factors: (1) The intrinsic importance of the product itself for use during the war, and the urgency, as measured by time, of the demand or of the use to which it is to be put; (2) the necessity for maintaining or stimulating and increasing the total quantity of production, which in turn depends largely upon the relation of the supply to the demand for essential uses; (3) the proportion of the capacity of the industry or plant which is devoted to the production of the essential product.

Method of Deciding Priority.

"Where it is imperative not only to maintain but to stimulate and increase production to satisfy abnormal demands created by war requirements a high rating is necessary, even though the intrinsic importance of the product may be less than that of other products placed in a lower classification due to the fact that the supply of such other products equals the demand without the stimulus of high priority. Where it is necessary to speed the production of a particular product required at a particular time to carry into effect an important program a high priority is given, although changing conditions may thereafter suggest and demand a reclassification. Certain plants produce commodities of great relative importance, but at the same time produce other commodities of less relative importance, and under such circumstances consideration and weight is given to the ratio of production between the more important and less important commodities. Instances occasionally arise where individual plants are given preference so long as they are rendering and so long as it is in the public interest that they should render a particular service, even though, taking the

country as a whole the supply of their product is ample to meet all demands.

"No distinction has been made between any of the industries or plants within any one class, and no significance attaches to the order in which industries and plants are listed within any class.

"The industries and plants grouped under Class 1 are only such as are of exceptional importance in connection with the prosecution of the war. Their requirements must be fully satisfied in preference to those of the three remaining classes.

"Requirements of industries and plants grouped under Class 1, Class 3 and Class 4 shall have precedence over those not appearing on the preference list. As between these three classes, however, there shall be no complete or absolute preference. The division into classes is for the purpose of presenting a composite picture of the relative importance of the industries and plants embraced within each group. It is not intended that the requirements of Class 2 shall be fully satisfied before supplying any of the requirements of Class 3, or that those of Class 3 shall be fully satisfied before supplying any of those of Class 4.

Basis for Rationing.

"The classification does, however, indicate that the industries and plants grouped in Class 2 are relatively more important than those in Class 3, and that those in Class 3 are relatively more important than those in Class 4. It will often happen that after satisfying the requirements of Class 1 the remaining available supply will be less than the aggregate requirements of the other three classes, in which event such supply will be rationed to the industries and plants embraced within those classes. In determining a basis for such rationing the relative importance of each industry and plant, according to its class rating, must be considered. It has been found impracticable to prescribe for rationing purposes any general and uniform rule or formula, but the Priorities Board will from time to time, after conference, and in cooperation with each of the several governmental agencies charged with the distribution thereof, determine particular principles, values and methods of application which may be followed in allocating fuel, power, transportation and labor respectively to the end that proper recognition and weight may be as far as practicable in each case be given to the relative importance of Class 2, Class 3 and Class 4.

"Each plant listed as such shall not later than the 15th of each month file with the Secretary of the Priorities Board, Washington, D. C., a report on P. L. Form No. 3 (a supply of which will be furnished on application) covering its activities during the preceding month. Any plant failing to file such report will be dropped from the preference list.

"Priorities in the supply and distribution of raw materials, semi-finished products and finished products shall be governed by Circular 4, issued by the Priorities Division of the War Industries Board under date of July 1, 1918, and all amendments and supplements thereto or substitutes therefor.

"The term 'principally' as used in listing industries shall be construed to mean plants whose output is not less than 75 per cent. of the products mentioned.

"This preference list shall be amended or revised from time to time by action of the Priorities Board to meet changing conditions. The Priorities Commissioner shall, under the direction of and with the approval of the Priorities Board, certify additional classes of industries and also certify additional plants whose operations as a war measure entitle them to preference treatment, which industries and plants when so certified shall be automatically included in the preference list."

The Acason Motor Truck Co., Detroit, has appointed H. A. Hawkins its agent in Atlanta, Ga., and surrounding territory.

Truck Builders to Discuss War Policies

The National Automobile Chamber of Commerce has called a meeting of industrial power vehicle manufacturers to be held at the headquarters of the organization at 7 East 42nd street at 2 o'clock the afternoon of Oct. 3, and notification has been sent to all truck manufacturing members to be represented. The request for the meeting was made by Windsor T. White, chairman of the commercial vehicle committee, and statement is made that there is necessity of each member being prepared to present views and to participate in the deliberations.

The meeting will be addressed by George M. Graham, chairman of the National Motor Truck Committee, whose subject will be "How the Motor Truck Industry Is Affected by Developments at Washington," and he will discuss in detail all the questions relating to motor truck production, such as priority, materials, preference list, classification of employees for the draft and the best method of retaining essential employees without interfering with the war program.

Besides this the meeting will consider "Taxes Levied Against Motor Trucks in the New Revenue Bill," "War Orders for Trucks," "Rural Motor Express," "Need for Uniform Laws," "Action on Plan to Standardize Truck Tires" and "Increasing Need for Improved Highways to Increase Motor Truck Haulage." In view of the conditions obtaining there is need of cooperative endeavor and complete understanding of the members in meeting the present uncertainty of the industry.

FORD'S MEXICAN PLAN.

Statement is made that Henry Ford has submitted to President Carranza of Mexico a proposition to establish a branch tractor plant in that country to cost several million dollars, planning to sell tractors practically at cost, payment for machines to be made from the proceeds of crops produced, practically keeping the money from tractor sales in Mexico. The plan proposes the training of Mexicans as mechanics in the shops of Henry Ford & Son in this country for the work to be done in Mexico.

NOW NAPOLEON MOTORS CO.

The Traverse City Motor Car Co. of Traverse City, Mich., at a meeting of the stockholders, changed its name to the Napoleon Motors Co., and increased the capital to \$500,000. The officers are: W. J. Chase, president; C. E. Cuiver, vice president; Frank Trude, secretary and treasurer; J. W. Oswald, general manager and chief engineer. The company will produce one and 1½-ton trucks.

Hess-Bright Ball Bearings



When you buy a really good truck—

you will probably get one equipped with Hess-Bright Ball Bearings for it is as true of trucks as passenger cars—the best makes use them.

For their quality is a definite thing—established by years of service. The little difference in first cost is lost in the value of the service rendered and that

service is a real thing because of the manner of their making.

When you buy Hess-Brights you add an asset to your business. For weeks and months, in and out, they will do their work without failure. They will maintain their reputation in your service.

THE HESS-BRIGHT MANUFACTURING COMPANY

Where Performance takes Preference over Price.

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

Boards May Exempt Road Transport Employees

The office of Provost Marshal General Crowder has issued a ruling on the classification of employees of transportation companies using trucks. The statement which has been authorized by the War Department and as issued by the National Automobile Chamber of Commerce to its members, is as follows:

"Concerns engaged in the transportation within cities and along the public highways elsewhere of necessary commodities may claim deferred classification for their necessary employees under the provisions of the recent act of Congress referring to 'persons engaged in industries, occupations or employments, including agriculture, found to be necessary to the maintenance of the military establishment, or the effective operation of the military forces, or the maintenance of national interest during the emergency.'"

"In such cases, as in all others where claim for deferred classification is made on this ground, evidence must be submitted to the district board to show (1) that the particular concern making the claim is 'necessary to the maintenance of the military establishment, or the effective operation of the military forces, or the maintenance of national interest during the emergency,' and (2) that the individual for whom the claim is made is a necessary employee of that concern."

AMAZON RUBBER ABSORBS O'NEIL.

The Amazon Rubber Co., Akron, O., has acquired the tire accessories business of the O'Neil Tire and Rubber Co., and also the exclusive right to use the name O'Neil in connection with this business, which will be continued as part of the Amazon enterprise.

An addition that will cost \$120,000 is to be made to the plant of the Cleveland Twist Drill Co., Cleveland, O.

ESTABLISH RETURN LOADS BUREAU AT ST. LOUIS.

The Return Loads Bureau at St. Louis, Mo., which was recently inaugurated under the auspices of the traffic department of the Chamber of Commerce of that city, is making very substantial progress in carrying out its objectives. A letter has been sent out to local shippers giving information regarding the time tables and warehouse facilities of five truck lines to towns 20 or more miles distant from St. Louis, and country produce on the Missouri side of the Mississippi river and coal on the Illinois side have been offered as return loads.

Several obstacles to a smoothly operating schedule have developed through the failure to observe the time cards and the failure to maintain warehouses in smaller cities where bills of lading can be issued.

BOSTON DEALERS MAY STOP FREE DEMONSTRATIONS.

A. H. Sowers, distributor of Fulton trucks at Boston, Mass., has worked out a plan under which the free demonstration of trucks would be abandoned, and will seek to have the other distributors in that territory adopt the idea. Mr. Sowers requires a cash deposit of \$25 from a prospect who wants a demonstration, and this entitles the latter to have the truck operate a full day doing whatever work he stipulates. If the prospect buys the truck the \$25 is credited on the purchase price, while if no sale is made the deposit is retained as compensation for the demonstration.

BUICK ERECTING ADDITIONS.

Two new factory buildings are being erected at the Buick plant at Flint, Mich. Both additions will be used to increase the production of Liberty engines. One building is to be two-story structure, 80 by 240 feet, and will cost approximately \$78,000, and the other is to be 120 by 300 with a front building 90 by 240 feet, which will be used as an aluminum foundry.

Big Truck Increase in Bay State

The registration of motor cars in Massachusetts for the first eight months of the present year shows an increase of 32 per cent. in the number of trucks, as compared with only 11 per cent. in passenger cars. From Jan. 1 to Sept. 1, 1918, there was a total of 183,467 automobiles registered in Massachusetts, including 151,818 passenger cars and 31,649 trucks, as compared with a total of 160,442 for the corresponding period of 1917, which included 136,417 passenger cars and 24,025 trucks.

The entire registration last year was 174,274, including 26,008 trucks and 148,266 passenger cars. This year's registrations for the first eight months, as compared with the corresponding period in 1917, show an increase of 23,025 in the total; 15,401 passenger cars and 7,624 trucks, and as compared with the entire year of 1917 the increase in total is 9,193, with an increase of 3,552 in passenger cars and 5,641 in trucks.

TRUCKS HAUL LUMBER CLAMPS OVER MOUNTAIN TRAILS.

An extremely unusual use, which is nevertheless productive of great economy, is made of power trucks by the Madera Sugar Pine Mills, one of the largest lumber companies on the Pacific coast. The mills are in the mountains, 60 miles from tidewater, and produce from 250,000 to 300,000 feet of lumber daily. In its operations the company uses about 20 miles of logging railroad, five locomotives, 15 logging donkey engines (portable plants) and employs from 700 to 800 men.

The lumber is sawn at the mill and stacks bound with steel clamps are floated 60 miles to Madera in a flume constructed through the mountains, where it is finished, loaded and shipped. The steel clamps are hauled to the mill by a fleet of five 3½-ton Federal trucks, and are used constantly for 'stacking the lumber for flume floatage. For two years three trucks were used and this year two more were added. Previous to using trucks from seven to 12 12-horse teams were used for this work, from 10 to 12 teams at the beginning of the lumbering season. Everything used at the logging camp, from locomotives to provisions and men, is transported through the mountains. The five trucks replace from 90 to 160 horses and do the work immeasurably faster.

VACUUM CORP. CHANGES NAME.

The Vacuum Muffler Corporation has been incorporated under the laws of New York state as the Vacuum Muffler Corporation of America, with a capital of \$200,000. The following board of officers has been elected: Oluf Klaer, president and treasurer; Gunnar Hartman, vice president; D. K. Keiler, secretary; C. S. Shuman, general manager.



One of the Fleet of Five 3½-Ton Federal Trucks Used in the Operations of the Madera Sugar Pine Mills in California.

ROSS GEARS

THE manufacturers of one hundred and fifteen different motor trucks, representing *considerably over half the industry*, are now using Ross Steering Gears as standard equipment. In this number are many of the largest and best known makers in the country. However, whether his output is 10,000 or only 100 trucks a year, the manufacturer who appreciates and buys the added *safety, reliability and easy steering* that Ross Gears guarantee, is undoubtedly putting the same superior quality into every manufacturing detail of his truck. Every man who buys a truck and every manufacturer owes it to himself to investigate and to demand the superior service of "the steering gears that predominate on motor trucks."

*Write for catalog and
other information*

ROSS GEAR & TOOL COMPANY
790 Heath Street
Lafayette
Indiana

The Steering Gears that Predominate on Motor Trucks

(When Writing to Advertisers, Please Mention the MOTOR TRUCK.)

GRESSLEE MADE DISTRICT SALES MANAGER.

The All-American Truck Co., Chicago, has appointed Charles H. Gresslee its district sales manager for the sale and distribution of All-American trucks in the middle west section of the country. Mr. Gresslee resigned as division sales manager for the Selden Truck Sales Co., with headquarters at Cincinnati, O., which position he had held for 18 months, to join the All-American Co. Previous to his connection with the Selden Truck Sales Co. Mr. Gresslee was general manager for the Union Petroleum Co. of Philadelphia, for about three years, and for prior to that was with the Franklin Oil and Gas Co., Bedford, O., for a year as sales manager. Before joining the Franklin company he was for three years vice president of B. A. Stuart & Co., Inc., Chicago. Mr. Gresslee is widely known in the industry and trade.

STEEL FORGE MERGER.

Having taken over the business of the Crucible Steel Forge Co., Cleveland, O., the Electric Steel and Forge Co. of that city has made plans for expansion and very large increase of the business. It purposes to acquire adjacent property and erect a series of buildings, which will include a rolling mill, machine shop, heat treating department, two electric furnace units and other divisions necessary for production. The plant will have an output of from 9000 to 10,000 tons of tool and alloy steel yearly, and the capacity of the forging and rolling departments will exceed this tonnage.

The company will produce carbon and tungsten tool steels, special alloys and nickel, chrome, chrome-vanadium, chrome-nickel, silicon-manganese and other steels and besides billets and bars it will turn out heat treated piston rods, gun forgings, gun mount forgings, spindles, ring gears, gear blanks, shafts, die blocks and rings and other specialties. The company's officers are James H. Foster, president; D. W. Wells, vice president and general manager; C. R. Cross, secretary, and A. B. Smythe, treasurer.

LANSING FORGE CO. EXPANDS.

The Lansing Forge Co., Lansing, Mich., recently took over the Emergency Drop Forge Co. and has been partially reorganized through the interests of outside capitalists. The old plant has undergone complete renovation and has been modernized in every respect, while an addition is now under way which will be completed about Oct. 1. This new building, which is 67 by 80 feet, will be used for dies and stock storage.

Some idea of the demand for farm tractors may be gained from the fact that a concern that is probably the largest in the industry was forced to reduce its season's allotment to branches and agents approximately 50 per cent. of the demand.

Hanch to Address Members of N. A. C. C.

The members of the National Automobile Chamber of Commerce will meet at headquarters at 7 East 42nd street, New York City, at 10 o'clock the morning of Oct. 3, in regular session, but the meeting will have unusual importance from the fact that Vice President Hugh Chalmers will make a report as to how the industry is affected by the needs for prosecuting the war as determined by the officials at Washington.

Besides this, C. C. Hanch, chief of the Automotive Products Section of the War Industries Board, will be present by invitation and will answer questions relating to priority, material and various other problems that have arisen in the industry from the orders issued by the board. He will talk on subjects of importance in connection with automobile production and trade and the industry's cooperation with the government. Statement is made that in view of the situation being acute so far as the industry is concerned, every manufacturer of vehicles should be present at the meeting.

GENERAL MOTORS GETS STEEL FOR CONSTRUCTION.

The construction of the tractor department of the General Motors Truck Co. will be carried out as projected, the War Industries Board having released to it 3297 tons of structural steel necessary in the erection of different buildings. Of this total 1400 tons will be used for the tractor plant and 1397 tons for the gray iron foundry, both at Saginaw, Mich., and 500 tons for the tractor and implement plant at Janesville, Wis., which is known as the Janesville Machine Co., recently acquired by the General Motors Co.

The early completion of the different plants is expected, and as quickly as is possible production will be begun in all of them. At the gray iron foundry the castings for engines will be made. Only the first unit of the foundry is to be built.

REO TO BUILD ARMY TRACTORS.

A government order for artillery tractors has been placed with the Reo Motor Car Co., Lansing, Mich. This work will not require all of the Reo plant facilities and the manufacture of Reo trucks will continue until the war work requires all the factory's product.

VELIE TRUCKS SENT OVERLAND.

A fleet of eight army trucks recently completed at the plant of the Velie Motors Corporation at Moline, Ill., were sent overland to Camp Benjamin Harrison. They are part of a shipment to go overseas.

PACKARD CO. DISTRIBUTING "OUR WAR TIME PLEDGE."

The Packard Motor Car Co. of Detroit is distributing a small poster, the subject and title of which is "Our War Time Pledge." It has been sent to all owners of Packard trucks and a copy will also be sent to the owner of truck who applies for it.

The truck owner in displaying it pledges himself to operate his truck in such a manner that it will be instrumental in winning the war. This pledge was originated in cooperation with the Highways Transport Committee and the Council of National Defense, the United States Fuel Administration and the War Industries Board. Every truck owner in living up to the pledge is committed to carrying return loads and full loads whenever possible; to the cause of good roads; to the conservation of gasoline, rubber and man power through more careful and efficient operation of his truck.

THE RUSSEL MAGAZINE.

Many interesting statements and pithy facts are presented in the Russel magazine, a little publication issued by the Russel Motor Axle Co., Detroit, Mich., and edited by Allen C. Chambers. The purpose is to distribute the magazine to motor truck salesmen in the interest of the internal gear drive axle principle. The pages are small and the subjects are briefly dealt with, but there is presented some splendid food for thought. The magazine will no doubt be welcomed by all readers, and they should be many, if merit is a reason.

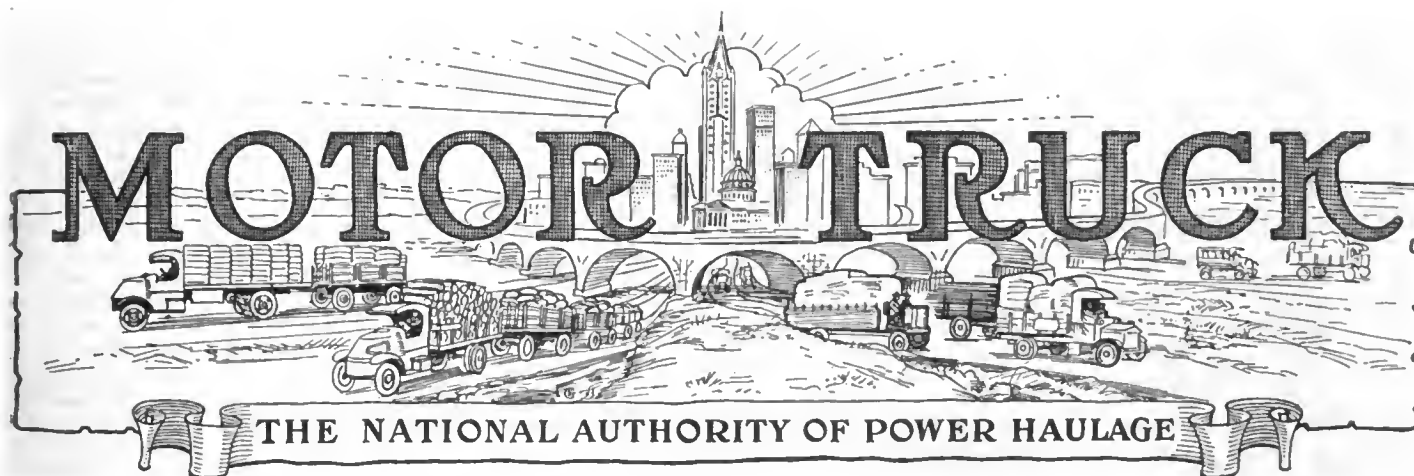
DEVELOPING RAIL TRACTOR.

A Fordson tractor, with wheel coupled by rods so that each pair on either side is driven by the rear wheel, this following the practice of locomotive builders, is in use at the Fordson plant at Dearborn. Thus far it has been used experimentally, but it is stated to have shown sufficient power and utility to justify continuance. There is belief that these machines would be very economical in certain conditions.

CONSOLIDATE MAXWELL AND CHALMERS BRANCHES.

The New York City branches of the Maxwell and Chalmers cars have been consolidated, with headquarters at the Maxwell salesrooms, 1808 Broadway, under the management of Harry J. De Bear, who has been head of the Maxwell branch for the past four years. Passengers cars, motor trucks, motor tractors and farm tractors will be handled at this location.

The American Red Cross has appointed A. B. Jones, second vice president of the B. F. Goodrich Rubber Co., Akron, O., director of transportation and distribution in France.



Vol. IX. No. 10.

PAWTUCKET, R. I.

OCTOBER, 1918

TEXTILE MILL TRUCK SERVICE

Centerdale Worsted Mills, Operating Chain of Road-Connected Plants 8½ Miles Between Ends, by Adjustment of Production Plan Minimizes Its Inter-Mill and General Haulage Expense

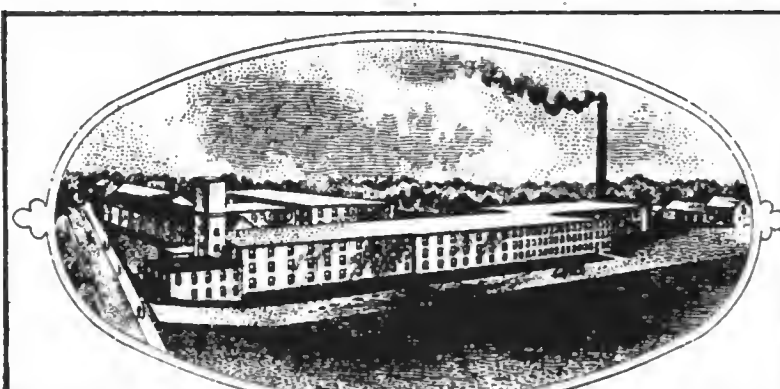
A MAJORITY of the textile mills of America are in New England. When the industry was pioneered by the building of a mill at the "Falls" at Pawtucket, R. I., by Samuel Slater, the choice of location was because water power was available. The steam engine had not been developed and water was the only dependable power. Those following Slater in textile production acquired water rights and built mills, often on streams that today appear ridiculously small, but then supplied ample power for all operations.

These mills were usually on tributaries of navigable rivers, for water was the general means of transportation, highways were mere paths and railroads

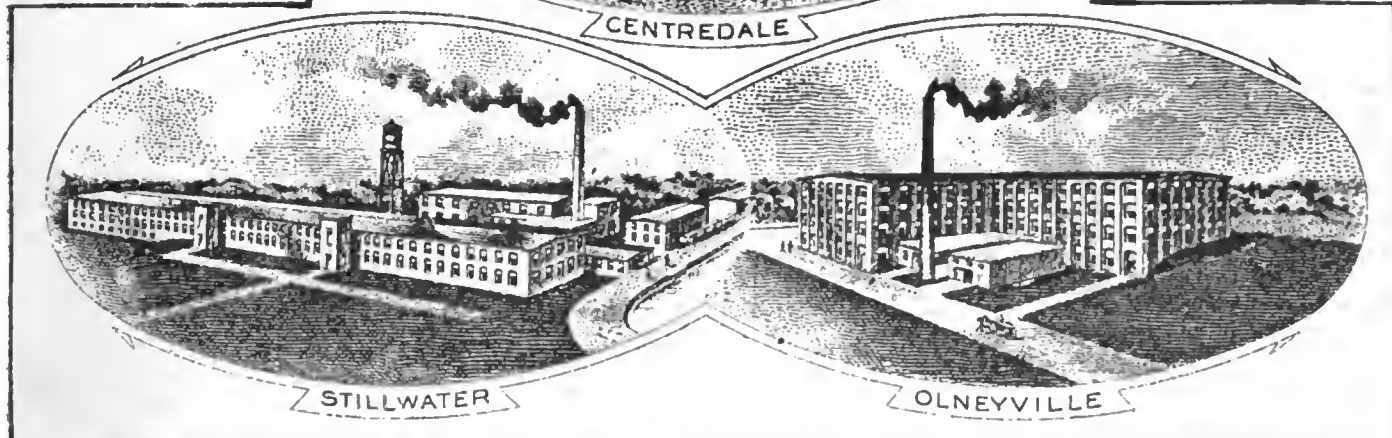
were of the future. About these mills villages often were built. Later on, when railroads were projected, if these communities were of importance they were reached by the main line or branches. Frequently water rights on rivers were very close together and in valleys succession of villages were often built, each practically dependent upon

the activity of the one local enterprise.

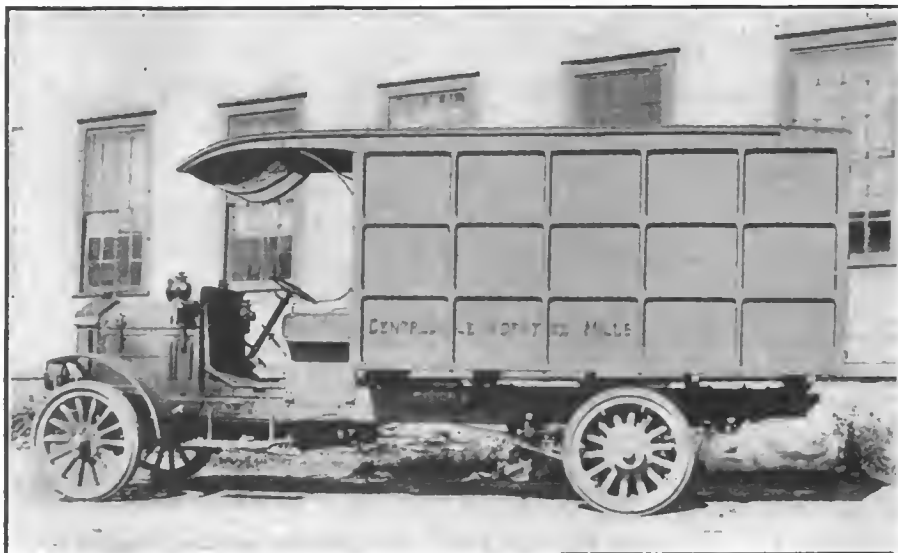
Frequently the tonnage of raw materials and finished products received at and shipped from a village was sufficient to impel the construction of a railroad. The cost of transportation was small as compared with today and time was not so important a factor in sales. With the increased use of steam engines, due to the variability of water flow, the improvement of railroad and water transportation and the low cost of fuel, water rights were regarded as secondary. Not only this, wherever mills had been increased in size and the power requirements exceeded what could be produced with water steam engines were auxiliaries, if not the main dependence.



CENTREDALE



Three of the Centerdale Worsted Mills Chain of Plants, 8½ Miles by Road from End to End, in the Woonasquettuck River Valley, Near Providence, R. I., for Which a Very Unusual and Productive Haulage Plan Has Been Developed.



Truck No. 1 of the Centerdale Worsted Mills, Operated Since July, 1913, with a Body Specially Designed for Carrying Wool Top to Yarn Mills.

A very general policy of the industry later on was centralization, this applying to expansion and establishment of new enterprises. Many small mills were abandoned. The reason was the belief that small operations were less economical than large, that skilled labor was not easily obtainable in the country and transportation was costly, especially if the distance were considerable and highway haulage was necessary.

In some instances manufacturers operated a chain of several mills, the collective production being considerable. If water rights were owned these have become much more valuable with the increased cost of fuel. The capital invested in the plant was smaller than would be represented in similar mills in cities, and the taxes and other items of overhead cost were considerably less. The principal item of additional cost was transportation. The main proposition was to so minimize this that production would be at parity with other mills engaged in the same manufacture.

Can Control Highway Haulage.

Transportation that may be controlled by the manufacturer is wholly by highway vehicle. Where a chain of mills are operated production may be planned so that the ratio of productive haulage may be considerably in excess of ordinary, which may be estimated as from 35 to 45 per cent. of the total mileage. The object of this article is to detail the use of power trucks by a concern owning a chain of mills that has adapted its operation to meet conditions with a very large measure of success.

Located in the valley of the Woonasquatucket river, in the Olneyville section of Providence and the towns of Johnston and Smithfield, are the four plants of the Centerdale Worsted Mills, a concern of considerable proportions, the properties being at Olneyville, Allendale, Centerdale and Stillwater. The company specializes the production of woollen yarn, which is delivered or shipped to weaving mills for manufacture into cloth.

The plants are successively north in

the river valley, Allendale three miles above Olneyville, Centerdale three-quarters of a mile beyond Allendale, while Stillwater is $4\frac{1}{4}$ miles further on, there being approximately $8\frac{1}{4}$ miles between the north and south mills.

All Reached by Main Road.

Woonasquatucket avenue in Providence and Johnston becomes the Chepachet road through Centerdale, and then the Georgiaville road continues north through Stillwater and beyond to North Smithfield and Woonsocket. This statement is made to establish there is direct highway communication between each village and mill. The track of the Providence and Springfield branch of the New Haven railroad, which extends to Pascoag, R. I., passes through Centerdale and Stillwater, but the Allendale and Olneyville mills are off the railroad.

The office and main plant is at Centerdale. This was the first property operated by the company, and after several additions and expansion quite beyond expectation the mill at Stillwater was acquired. When the capacity of this was exceeded the Allendale mill was

bought and when the production of the three would not meet the demand the Olneyville mill was purchased and the chain of four as now existing established.

Three Mills Have Water Power.

All of the three upper mills have considerable water power available, and they have steam auxiliary plants, but that at Olneyville is operated entirely by steam power. All of the mills must be supplied with fuel and raw materials and the products must be shipped. The tonnage handled during a given period will vary considerably, so far as shipping is concerned, and there is some variability as to the raw material received, but the volume of fuel is more nearly a standard.

The raw material may be received at the Olneyville or the Providence freight yards (the former being about one mile from the Olneyville plant, and the latter two miles), but the greater part of it at the Providence terminal. This must be hauled to Olneyville. The supplies may be received at either freight yard and hauled to Olneyville or Allendale. Supplies may be shipped direct by rail to Centerdale and to Stillwater, and hauled from the Centerdale station to the mill, but at Stillwater there is a railroad siding into the mill yard and practically no baulage is required. Fuel is hauled only to the Centerdale mill, and there from cars on a railroad siding. The coal can be delivered directly in car load lots at the spur track at the Stillwater mill, and the coal for the Olneyville and Allendale mills is delivered by a Providence dealer who has contract for supplying them.

Handling the Mill Products.

The shipping, however, must be handled differently. The products of the mills in cases or crates are delivered first at the Centerdale mill and either sent out in railroad cars on the branch of the New Haven railroad, or they are delivered at the Olneyville and Providence receiving freight houses, or they are sent to the different mills in and near Providence, where they are to be used in fabric production, or delivered at the piers of the several water transportation lines in Providence. These



Truck No. 2, Centerdale Worsted Mills Equipment, Used Principally for Haulage of Baled Wool and Wool Top, with a Load of Raw Material at the Olneyville Plant.

piers are about a mile from the Providence freight yard and about three miles from Olneyville. This means that water shipments or receipts must be hauled one or two miles further than the railroad yards.

The Olneyville mill is near the top of a hill and two grades must be descended and one ascended going to the center of Providence and the water line piers. Returning, this is reversed. Going to the Providence freight yard there is one heavy grade to descend, and the same grade to climb on the return trip. This applies also to haulage to and from the Olneyville yard. Between the Olneyville mill and the Allendale and Centerdale mills the highway is level and smooth, but beyond this to Stillwater the road is a succession of small hills, always ascending, and the surface is fair at best and in some parts poor.

The Plan of Production.

The Olneyville mill is given over to the production of wool top. The wool, received in bales, is sorted, scoured, carded, combed and made into top, which may be described for those who have no textile information as being a yarn or roll of perfectly clean wool, from an inch to $1\frac{1}{4}$ inches diameter, in which all the wool fibers are laid parallel by carding and combing. The top strands are soft and resilient and the fibers adhere to each other. The strands are wound into large balls, each a given size and containing a certain weight of a specific quality of wool, and in this condition are distributed to the other three mills for manufacture into yarn. Wool top must be handled with more care because if by contact with any rough object the parallelism of the fiber is changed the part that is not in perfect condition will in the yarn making cause imperfections. The imperfections may cause the rejection of the yarn and at least loss of time and labor.

The tops are hauled to the mills at Centerdale, Allendale and Stillwater, and there are spun into yarns of sizes to meet the requirements of orders. A very large part of the yarn produced was sold for delivery as spun, and was either shipped or delivered to customers who did their own dyeing, or shipped to dyers who colored it and then in turn shipped it to the weaving mills, where it was turned into fabric. The conditions, so far as production are concerned are unchanged, but a very large part of the yarn made is now used to fill government contracts, and one of the conditions of these contracts is that the wool shall be colored in the top before spinning.

Wool Top Must Be Dyed.

The Centerdale Worsted Mills do no dyeing and for this reason after the top has been made it must be sent to Pascoag for dyeing. The wool top for yarn to meet government requirements is taken from Olneyville direct to Pascoag by truck and brought back to either of the other three mills for spinning. The Centerdale and Allendale mills are now running practically full time and the Stillwater mill is operating 50 per cent. of its capacity on government contracts,

with the prospect that within a very short time all plants will be producing only to governmental specifications.

The Olneyville mill is now operating to full capacity day and night and the Allendale and Centerdale mills are operating to 50 per cent. of their capacity nights, but the Stillwater mill is operated days only. Were it not for the shortage of labor the mills would be worked constantly to full capacity. There are those who may assume that the operations of the company might be more economical if centralized at one plant. This might be so, but such economy could only be obtained by the sacrifice of several of the mill properties. Such loss would not be justified by any practical saving, and for this reason the transportation necessary must be systematized and such equipment and methods used as will minimize the expense. When the company operated only at Centerdale the condition was similar to that of any individual plant. The mill was comparatively small and the railroad transportation expense was not heavy.

meant that road haulage was but little increased with the operation of this property.

Top Making at One Mill.

As originally operated all of the processes of manufacture took place at the Centerdale mill, that is, the wool being made into top and the yarn spun ready for the dyer. This was also the manner of operating the Stillwater mill, and the same policy was followed when the Allendale mill was bought, but at this plant all of the fuel and raw material was hauled from Providence. The finished yarn was trucked from Allendale and Stillwater to Centerdale and shipped, because at this plant the railroad siding was available and whatever number of cars was needed could be obtained with less rail haulage than from Stillwater. Allendale was so much nearer Centerdale than Olneyville that shipping from Centerdale was in every way logical.

When the Olneyville mill was bought the operating plan was changed. This was made an exclusive top mill, the top departments being removed from Allendale, Centerdale and Stillwater, these



Truck No. 3, Centerdale Worsted Mills, Used with Convertible Body for General Haulage, but Largely to Carry Wool Top from Olneyville to Dye Houses and to the Yarn Mills.

Short Haul at Centerdale.

The railroad at Centerdale is on the west bank of the Woonasquatucket river and the mill on the east bank, the distance from the mill to the siding that serves as a freight yard being approximately 200 yards. Then both raw material and fuel were received there and hauled from the siding to the mill, the haul probably not exceeding 250 yards. But there was need of handling (loading and unloading) every load carted, and there was considerable labor cost.

The only practical saving was the extension of a spur track into the mill yard, but as the river must be bridged and the railroad demanded a large price for the construction and rental, this project was abandoned and the haulage continued from the siding to the mill. One of the reasons for acquiring the Stillwater mill property was the fact that there was a railroad spur into the yard, all of the raw material and fuel could be delivered with but one handling, and the coal could be discharged direct from the cars into the power house of the mill. This

three mills being given over exclusively to yarn production. The raw material must be hauled from the Providence or Olneyville freight yards, but a fuel contract could be made that included delivery at the mill. There would be no haulage from this plant except to the yarn mills, this, of course, being the minimum, but this simplified the operating plant of the haulage equipment. The unit that took wool top to Stillwater brought back yarn to Centerdale. The unit that took wool top to Allendale took yarn to Centerdale, and from Centerdale shipments were made to the yarn customers in Providence and vicinity or the shipments were made by railroad from Centerdale.

Haulage Made More Productive.

This plan made possible loads for the vehicles a much greater part of the mileage than would ordinarily be realized. Of course the volume of highway haulage depended largely upon the deliveries made in Providence, and this could not be controlled, but the movement of the raw material to the Olneyville plant, and

of top from that mill to Allendale, Centerdale and Stillwater, and of yarn from Stillwater and Allendale to Centerdale was practically constant. At least all the top was handled, and all of the yarn, but the shipments from Centerdale were variable.

The operation was developed to approximately these results:

Haulage, loaded, Olneyville to Stillwater	8½ miles
Haulage, loaded, Stillwater to Centerdale	4½ miles
Round trip, 17 miles, loaded 13½ miles.	
Haulage, loaded, Olneyville to Centerdale	3½ miles
Round trip, 7½ miles, loaded 3½ miles.	
Haulage, loaded, Olneyville to Allendale	3 miles
Haulage, loaded, Allendale to Centerdale	¾ mile
Round trip, 7½ miles, loaded 3½ miles.	

This was with reference to haulage of material in process of manufacture between the mills. There was need of hauling all of the yarn from the Centerdale mill to the railroad siding for rail shipments, which involved two handlings and a very large ratio of waiting time because of the extremely short distance.



Truck No. 4, Centerdale Worsted Mills, Used for General Works and Yarn Haulage, at the Centerdale Plant with a Load of Jack Spools.

The wool and the supplies for practically all the mills was transported from the Providence piers and the Providence and Olneyville freight yards.

First Truck for Top Haulage.

The first truck was bought five years ago. This was a two-ton Pierce-Arrow chassis on which was installed a large panel body with rear doors, with a driver's cab. As this body was to be used for hauling wool top, which was not to be crated or packed, and there was need of protecting this from contact with any rough object, the body was given a glass-like finish inside and shellacked. The body work was for this reason more expensive than would ordinarily be required for mill purposes. Because of the care this body was given the truck could not be used for general work. Up to time this truck was bought the company had carts and wagons and owned from 12 to 14 horses, operating these from the Centerdale plant. It had a good deal of work done by contracting truck men and as the production of yarn increased practically all of the time of the truck was required for haulage of top and

yarn. Deliveries to Providence customers were made by the carts or wagons and the outside truck men. The haulage of material from the Providence and Olneyville freight yards was made by the carts, wagons and hired trucks.

The truck was used for two years with satisfaction and in July, 1915, the second two-ton Pierce-Arrow chassis was bought. This was equipped with a platform deck and driver's cab, with panel or stake sides that were interchangeable, and this was utilized for haulage of the top and yarn that could not be carried by the other machine. There was necessity of protecting the top when this was hauled, and another method of packing when loading was adopted. The bodies of both trucks were large because the wool top and yarn is bulky rather than heavy.

Third Truck a Five-Ton Unit.

The number of horses was not decreased and there was but little diminution of the volume of haulage done by contracting truck men. In fact, one truck man gave what might be regarded as regular service, hauling wool from

the Allendale and Stillwater mills to Centerdale, for the other trucks could not meet all the requirements. Because of the overtime work necessary the contract work was continued, the greater part of this being done by one man who has been engaged in mill haulage for a number of years and whose familiarity with the needs makes possible a character of service that fits extremely well with the operating plan of the company.

Trip to Pascoag Dye Works.

The requirement of the government that all wool top be dyed before it is spun necessitates the haulage of the top from Olneyville to a Pascoag dyer. The distance between Olneyville and Pascoag is about 18 miles. The five-ton truck is used for the greater part of this work, and a load is carried in either direction, top from Olneyville to Pascoag and the dyed top from Pascoag to Stillwater, Centerdale or Allendale. Pascoag is about four miles off the main highway from Providence to Hartford, and the Stillwater mill is about 4½ miles off this same road, so that there is necessity of hauling this added distance in making delivery of top from Pascoag to the Stillwater mill, the truck having to return nearly to Centerdale and thence north to Stillwater. But as yarn is taken to Centerdale after delivery of top, as a rule, the mileage of the truck in this work is practically 100 per cent. productive.

The operation of the trucks cannot be a specific work each day because the volume of haulage will vary. Within the next 30 days, however, the mills will be working on government contracts exclusively, and this will mean that all top will have to be taken to Pascoag for dyeing. This will somewhat increase the tonnage and possibly the mileage. If sufficient help is obtainable to operate the mills full time at night the tonnage to be handled will be largely increased.

Operating System Logical.

The present plan of operating the transportation equipment of the company appears to be the best and most simplified that could be arranged. Fuel must be hauled to the Olneyville and Allendale plants, but it can be shipped by rail to Centerdale and Stillwater. Manufacturing top exclusively at Olneyville and hauling it to Allendale, Centerdale and Stillwater is the most logical, for in any event it could only be shipped to Centerdale and Stillwater, and there would be a truck haul of a mile and two additional handlings, while there would be uncertainty as to time. As the trucks must go to Allendale and Stillwater with top they can haul full loads of yarn to Centerdale, which adds greatly to the loaded mileage and increases the economies of the machines.

Besides the haulage of top and yarn there is regular cartage between the mills, between the main office at Centerdale and Providence and between the Providence railroad and water line terminals and the Olneyville plant. The loaded mileage of the trucks will reach about 75 per cent. aside from the 100 per cent. productive haulage between the yarn mills and the dye works at Pascoag.

The company has its own garage at

the Centerdale mill, where a mechanic maintains the trucks and keeps them in good condition. The trucks are given systematic care and attention because the company knows that machinery must be kept well to have highest productivity and that there is the same need of efficiency in trucks that there is in any machine equipment in the mills. The mechanic has the resources of the mill machine shop whenever there is need of doing work that would not be practical in the garage. He can get work done quickly and the cost is small as compared with the charges that would be made by service stations. Not only this the work can be done so that there will be the least loss of service.

The trucks are worked by common sense methods. They are not overloaded and they are not driven fast. The drivers make daily report of the condition of their machines and the vehicles are inspected carefully. Repairs and adjustments are made when needed and the overhauls are systematically made. If one of the trucks is withdrawn for necessary work, what cannot be done by these in service is done by contract truck men. There is no economy in using a truck that needs attention and working it until repairs must be made that will cost large amounts. Constant and consistent upkeep is better than occasional large repair bills.

Trucks Are Well Maintained.

The best evidence of results is that the first machine, now in service more than five years, is doing more work than ever and quite as economically as when first purchased. The truck is in excellent condition and seemingly is good for a considerable period more. The work is extremely variable and the mileage may range anywhere from 10 to 100 miles a day, so that averages do not represent the work as accurately as in other services. The company expects to keep the trucks busy and they are kept moving so far as this is practically possible, but of course loading and unloading of material that must be carefully handled takes time.

So far as repairs are concerned the maintenance cost is considerable because the machines are well kept, but this is compensated for by prolonged service life and very moderate operating cost (aside from repairs). Considering the highways and roads the fuel consumption is very fair. The gasoline consumption of the two-ton trucks is comparatively low, the average being from six to seven miles to the gallon, but the consumption of the five-ton truck is rather high, possibly due to the hills, being from three to 3½ miles to the gallon.

Normally the trucks are worked from 6:50 to 12 and from 12:35 until 5:35 each day, save Saturday, or 10 hours a day, but there is more or less overtime necessary because of the night work. The first driver hired was experienced and had worked for others, but all other drivers were selected from the company's employees, because they knew more or less of the requirements, knew the mills and the roads and understood

the industrial discipline. They were found to be satisfactory in every way and have given the trucks good care.

The company now has but three horses, these being used for general work about the mill yards, the cost of which would be considerably increased were trucks utilized. Not only this, the trucks can be worked more profitably elsewhere.

Trucks Cost More, But—!

With reference to the cost of trucks as compared with horses. This has been found to be somewhat higher than animals in actual expenditure, but against this must be placed the elasticity of the trucks, which have a reserve of more than 100 per cent. If used continuously, greater dependability, more certain service, better control and a decided saving of time. Controlling a service that is independent of the railroads the company can make deliveries to meet contract schedules and better satisfy its customers within the operating radius of the machines.

The Providence and Springfield branch of the New Haven railroad, which serves Centerdale and Stillwater and reaches Pascoag, is quite as much affected by congestion as any other part of the system, and shipments other than for government work are by no means as rapid as in normal conditions. The company, for instance, cannot rely upon the railroad for quick shipments to and from Pascoag, and much time can be saved and handling minimized by the use of the trucks. The same statement applies with reference to shipments to Providence and vicinity, so that there are the best of business reasons for using trucks. Considering the comparatively small excess of cost the additional expense is justified and is a desirable expenditure from the viewpoint of the manufacturer.

Besides the trucks the company owns a high grade touring car that is used by the officers of the company for regular visits to all the mills, which are made at frequent intervals—sometimes two or three times each day and night. Besides this it is used for errands and Providence trips. A considerable mileage is made in the course of a day, but from the viewpoint of the company the car is productive of economies through the close oversight that is practical that much more than compensates for the cost of the service.

QUICK HANDLING OF LOADS SAVES TRUCK TIME.

Quick handling of loads and release of vehicles for haulage is in brief the haulage plan of the Carbo-Hydrogen Co. of America, which has a plant at Sewickley, Pa., and its main offices at Pittsburgh. The company produces carbo-hydrogen gas, which is used in the manufacture of various essential products, and gas is stored in steel cylinders or tanks that can be shipped as freight or express by railroad or other common carrier.

The cylinders weigh about 125 pounds each when filled. The containers are valuable and are returned to the plant for refilling when the contents have been used. The filled cylinders are delivered from the plant to the railroad terminals and the empty tanks returned to the company are hauled from the terminals to the factory. The company bought a Federal 3½-ton truck to haul cylinders. This machine has loads to and from the freight terminal, each about 50 cylinders.

The hauls are short, and as the cylinders must be hand handled a good deal of time would be required at each end was not the crew made up of four men, who make short work of loading and unloading, so that trips can be made quickly and a great deal of work accomplished, that would not be possible with any other method of operating. The truck and crew work 12 hours daily and the tonnage for a day mounts rapidly, because it is in both directions and the mileage is surprisingly large, all of it productive.

The results with this machine were so satisfactory that the company purchased another of the same make and size, which is used at its Cleveland, O., plant. The hauls at Cleveland are longer, but the same operating system is operated there.

The Liberty Motor Car Co., Detroit, is now producing an order for 2500 trailers for the government, similar to those being produced to contract by the Paige-Detroit Motor Car Co.

An addition is to be made to the plant of the Hudson Motor Car Co., Detroit, 460 by 60 feet, to cost about \$60,000, which may be used for war munition manufacture.



Federal 3½-Ton Truck Used for Hauling Gas Cylinders by the Carbo-Hydrogen Co. of America of Pittsburgh, Pa.

Michigan Wholesale Merchant's Store a Panhard Motor Truck



The Panhard Truck, Equipped with a Special Body, Used by John T. Wiersema, Muskegon, Mich., to Sell Direct to Country Stores.

John T. Wiersema of Muskegon, Mich., operates an unusual business, for he travels a considerable part of the northern section of the state and deals with store keepers, supplying them stock of different kinds that they could not otherwise obtain save by ordering from salesmen and awaiting delivery of the goods. Wiersema's plan is to have a

sufficient quantity of each kind of goods to fill the orders he expects on a given route and to make visits frequently enough to keep the stocks of his customers up to their standards.

He has been in business for a score of years, and the greater part of that time used a covered wagon, driving from village to village and town to town, gener-

ally off the railroads and doing business with store keepers, whose buying was chiefly through salesmen. To save the time on the road between towns, to develop business that he had neglected to make the most of, to call on prospective customers and to carry a larger stock, he purchased a Panhard truck, which he had equipped with a special body. The sides and rear end are really doors that may be raised, which give access to drawers and compartments—nearly 100 in all—in which are carried the different articles he has in stock.

Wiersema's plan is to show samples of such goods as are not known to buyers, which is done with a sample case he carries into the stores, and to make deliveries from the stock in the truck. As the stock is drawn upon it is replenished by orders sent by mail and goods delivered at different points along the route. The value of the Wiersema service to the store keeper is that he can depend upon regular visits, can obtain whatever is bought immediately, and all transactions are consummated. The store owner, moreover, receives personal attention and he can assure his own customers of satisfaction.

Wiersema now covers a route in six weeks that formerly required 12 weeks. He makes many more calls and he sells double the stock he did when he used horses. This is due entirely to the saving of time that is practical and to vehicle capacity to carry a larger stock. He does not work harder, but can apply his endeavors to selling instead of slow traveling between customers.

Truck Fleets Handle Laundry Work at Army Posts

At the garrisons, posts and camps of the army and navy in this country hundreds of thousands of men are stationed, and at very few of these do the men wash their own clothing. In the navy each man keeps his clothing clean and is required to wash it at stated intervals, but all shore or land camps do not exact this work, and wherever troops or naval commands are located away from vessels the laundries and wash women do a thriving business. The officers and men have their choice of where this shall be done, but obviously no one laundry, no matter what its capacity, could undertake the cleansing for a large camp or cantonment. For this reason the work must be distributed and collected, and sometimes sent considerable distances, to plants that can handle it within reasonable time.

The laundries have their own vehicle equipment as a rule, but this is used for regular collections and deliveries, so that any large volume of additional work could not be handled quickly or advantageously. Not only this, better prices can be made for work that is brought to and taken from the laundries. Some of the camps and cantonments

have their own trucks, that are used exclusively to collect and deliver laundry, and are kept busy practically all of the time, this service being maintained by the military organization for the benefit of its soldiery.

The accompanying illustration shows four of a fleet of 10 White 1500-pound chassis, equipped with covered screen-side bodies, that are used to handle laundry at Camp Funston on the Fort Riley reservation in Kansas. These machines are maintained at the post garage and are driven by soldier drivers. At times as many as 60,000 men are stationed at this camp.

HUPP CORPORATION EARNINGS.

The earnings of the Hupp Motor Car Corporation for the year ending June 30 has been announced as \$1.43 a share for the common stock which is a gain of \$1.09 a share as compared with the earnings for the previous year.

The Oakland Motor Car Co. and the Olds Motor Works, both old established concerns of the automotive industry, were among the bidders for contracts for the War Department for manufacturing army clothing opened at New York City.



Part of the Fleet of 10 1500-Pound White Trucks Used to Collect and Deliver Officers' and Soldiers' Laundry at Camp Funston, Kan.



Two-Ton Federal Truck Owned by the J. W. Roberts Co., Boston, Wholesale Grocer, for Delivery of Goods—An Exceptional Showing Was Made in a Month's Work with This Machine.

SMITH WHEEL EQUIPPED SANFORD FIVE-TON TRUCK.

The Sanford Motor Truck Co., Syracuse, N. Y., produces power trucks of 2½, 3½ and five tons load capacity, and a very strong indorsement of the machines is the comparatively large number bought by Syracuse business men. The company has delivered many trucks the past year within a radius of 100 miles of its factory, and the city of Syracuse is operating a fleet of these for general municipal purposes.

Recently Smith Wheel, Inc., Syracuse, bought a five-ton model W-50 Sanford truck. This concern is engaged in manufacturing truck wheels of cast metal, these being a special hollow type, the structure being reinforced by internal webs. As the use of any other wheels than its own on its vehicles might appear inconsistent, the company had the truck equipped with Smith cast metal wheels and the largest sizes that it produces. The truck as delivered had a large steel rear end discharge body, elevated by a hydraulic hoist, and it was intended for coke haulage principally, so the body was unusually large.

Smith Wheel, Inc., has numerous displays of wheels, some of them permanent in character, the wheels being gilded and strikingly lettered. The finish of the truck follows the same idea of developing the advertising value of a utility, for it is a bright yellow, with very conspicuous display of the name on the sides of the body. It is probably the most ornate coke truck ever in service. The fact that it is a Sanford is not lost upon those who see it on the streets and highways in and about Syracuse.

THE RUSSEL MAGAZINE.

The Russel Magazine, a tiny print, published by the Russel Motor Axle Co., Detroit, and edited by Allen C. Chambers, is decidedly interesting from the originality of the brief articles it contains and the pertinent arguments made for the internal gear drive for power vehicles. The September issue has much to recommend it. Copies will be sent by the company to all who make request and send their address.

LESSENING DEAD MILEAGE.

The object of those who advocate "return loads" is to reduce the dead or unproductive mileage of highway vehicles. In normal industrial or commercial service loads are hauled only for 35 to 50 per cent. of the distance driven. Increasing the loaded mileage means more work for practically the same cost.

The proposition is not visionary. The small cost of railroad freightage depends entirely upon loaded mileage. Statement is made that by loading freight cars nearer to capacity, by increasing the number of cars in trains, by shortening hauls under unified management, a considerable economy has been obtained by the Federal railroad administration. In June an increase of 5.6 per cent. in ton miles, and a decrease of 273,248,170 non-revenue ton miles was obtained with the railroad operated by the country, the comparison being with June, 1917. The number of train miles was also decreased 1.2 per cent. and the loaded freight car miles decreased 5.2 per cent.

These figures have no bearing on highway haulage other than to emphasize that carefully organized enterprises can make substantial savings by seeking economies, and those who do not know the cost of road transportation could probably save very largely were they to use proven accounting records and systems.



Sanford Five-Ton Truck, Owned by Smith Wheel, Inc., Syracuse, N. Y., Probably the Most Ornate Machine Ever Used for Coke Haulage.

WHOLESALE GROCERY DELIVERY BY MOTOR TRUCK.

Distribution of stock by wholesale grocers is necessarily an expense that is added to the prices of goods, for the service is essential to business. The concern that can minimize this expense can establish prices that will be lower and will attract buyers. As business is usually competitive, buying is always influenced by prices unless there shall be some special reason why a particular article is purchased.

Much, of course, depends upon the manner of distribution, the vehicles used, the organization, the system of handling and the distances of haulage. What can be done with a single vehicle is no basis for estimate of what can be done with another under different conditions, but records establish standards from which economies may be practical—either more work for the same cost or less cost for the same work, either of which will show a distinct saving.

The J. W. Roberts Co., Boston, a wholesale grocer, in one month distributed from its store with a two-ton Federal truck stock valued at \$18,597.39, during which the machine was driven 725 miles and made 54 trips in 27 working days, or two trips a day of 13.43 miles each. The total cost of this service was \$262.58, or \$9.73 a day, this including every item of expense of operating the truck. This cost was 1.41 per cent. of the value of the goods hauled. In addition to this the truck hauled to and from railroad terminals goods on which the haulage charges would have been \$20.23, and this revenue though seemingly small, reduced the actual cost to \$242.35, or about 75 cents less a day, and the actual operating cost of the truck to \$8.98 a day. This is considered by the company to be a very satisfactory result.

FOX IN MOTOR TRANSPORT.

C. L. Fox, for three and a half years assistant sales manager for the Saxon Motor Car Corporation, Detroit, has been appointed to the camp at Jacksonville, Fla., where officers for the Motor Transport Corps are trained.

NEW INDIANA MODEL Q 1½-TON TRUCK

COMPLETING a series of five capacities, the Indiana Truck Corporation, Marion, Ind., is now producing a 3000-pound chassis which in general follows closely the design to which the 2000, 4000, 7000 and 10,000-pound machines are built. The demand for an intermediate size between the 2000 and 4000 pound trucks was such as to impel the company to build a chassis to meet it, and there is expectation that a considerable part of the output of the concern will be this machine, which is specified as model Q.

In producing this chassis the engineer, guided by service experience with the other trucks built, made comparatively few changes, and incorporated in it many of the construction units, which had been amply proven and which were regarded as in every way satisfactory from the viewpoint of the manufacturer. These units are all large, have sufficient factors of safety to insure long endurance and economical upkeep and maintenance, and the operating cost is low for the load capacity.



Model Q Indiana Truck Chassis with Full Equipment, a New Size in Capacity That Follows One General Design.

The chassis is constructed of standard units, these including a Rutenber engine, a Borg & Beck dry plate clutch, a Brown-Lipe transmission gearset, Sheldon worm shaft and worm wheel rear axle, Detroit springs, Lavine steering gear, Indiana frame, Long radiator, Bimel wheels, Stromberg carburetor, Elsemann magneto, Acme universal joints and Pierce governor.

Model 38 Rutenber.

The engine is the Rutenber model 38, a four-cylinder, four-cycle, water cooled, I. head type, having cylinder bore of 4½ inches and stroke of 5½ inches, the rating by the S. A. E. formula being 27.25. Claim is made that this engine will develop 31 brake horsepower at 1000 revolutions, 43 brake horsepower at 1500 revolutions and 48 horsepower at 2000 revolutions. The unit is designed and constructed for heavy duty, the cylinders being cast in pairs from high grade gray iron with large water jackets integral. The cylinders are given hydraulic tests

after boring and when aged are finish bored and ground. The pistons are cast from the same quality metal as the cylinders and are light for the size. They are turned, annealed and ground to size. The pistons are bored internally to obtain equal weight. They are grooved for three rings. The wristpins are secured in the piston bosses by set screws and cottler pins.

The crank case is in two sections, cast from gray iron and heavily ribbed. The upper section has a vertical transverse central web that carries the center main bearings. The lower section serves as an oil reservoir. Both sections have front and rear extensions that form the housing for the timing gearset and the bell enclosing the flywheel, the former being covered by a plate and the clutch housing being bolted to the latter. The crankshaft is a three-journal type, drop forged from 35-45 carbon open hearth steel, that is heat treated and ground, and is 2½ inches diameter. The journals from front to rear are 3¼, three and 4½ inches length, a total of 11

inches bearing length. The shaft is very carefully balanced.

Details of the Engine.

The camshaft is drop forged from carbon open hearth steel with the cams integral and is a three-journal type. It is machined, hardened and ground to proportions. The shaft is so designed that it may be withdrawn from the engine case by removing the cover of the timing gearset. The connecting rods are I section, heat treated steel drop forgings and the wristpins are steel tube, hardened and ground. The timing gearset gears are large, have wide faces and are helically cut. The crankshaft, crankpin and camshaft bearings are high grade babbit and the two former are adjustable with shims. The valves have cast iron heads electrically welded to carbon steel stems and are fitted in renewable guides. The valve tappets are a mushroom type that operate in long guides and are fitted with adjusting screws and lock nuts.

Engine Cooling and Lubrication.

The engine is cooled by a circulation of water through the cylinder jackets and a finned tube radiator with cast top and bottom tanks, forced by a centrifugal pump driven by a shaft from the timing gearset. The radiator is mounted so as to be protected from cramping by chassis distortion and radiation is promoted by a fan carried on an adjustable bracket on a ball bearing that is driven by a flat belt from the water pump shaft extension. The engine is lubricated by a forced system, the oil being drawn through a gear pump submerged in the reservoir in the base of the engine case, being filtered by a screen. The oil is delivered at a pressure from 15 to 20 pounds to all bearings save the wristpins, and the cylinder and piston walls, the wristpins, the cams and valve tappets are lubricated by the distribution from the centrifugal motion of the connecting rods. The pump is driven from the rear end of the camshaft.

The carburetor is a Stromberg that is fed by gravity from a gasoline tank under the seat of the driver, and the source of the ignition current is an Elsemann magneto with manual advance. The engine is mounted on an I section steel casting fulcrumed on a yoke in the center of the engine case, retained by a hardened steel pin. The rear arms are integral with the bell housing of the flywheel. The engine is governed by a Pierce governor that is driven by an extension of the shaft of the oil pump and bevel gears and flexible shaft, the governor being located directly on the intake manifold.

Power Transmission System.

The clutch is a dry plate type that is enclosed in a case bolted to the bell housing of the engine case and it requires no adjusting, the wear being compensated by adjustment of the pedal lever. The clutch shaft is connected through a universal joint with the main shaft of the transmission gearsets, that is mounted on three points amidships in the chassis frame. This has four forward speed ratios and reverse. The shafts and gears are large and the construction is intended to endure hard service. The power is transmitted through a tubular shaft with a universal joint at either end to the Sheldon semi-floating worm shaft and worm wheel rear axle. This is built with a single piece cast steel housing, with a large central section, the cover of which carries the worm shaft and worm wheel and the differential gearset mounted on double row ball bearings. The worm shaft is also fitted with annular ball bearings, the thrust of the worm being taken by a double bearing.

The worm shaft, worm wheel, differential gearset and all bearings in the housing are lubricated by a bath of oil carried in the bowl of the central section. The driving shafts are carried in large bearings at the outer ends of the axle housing and the wheels are keyed to

the outer ends of the shafts and secured by nuts. The housing carries spiders on which the brakes are mounted. The front axle is an I section steel drop forging with the spring pads forged integral.

Frame and Other Detail.

The frame is constructed from rolled steel and it has heavy cross members and reinforcing gussets, and is designed to be semi-flexible. The frame is sus-

Acme Truck Company Expands Plant 70 Per Cent

The development of the Acme Motor Truck Co., Cadillac, Mich., which was established several years ago, has been extremely rapid. The company has pro-

shop the company does all its machining and it also does all its forging and heat treating and other metal work. The coordination of all departments and careful supervision insures a high standard of construction.

The second addition made this year to the body building department is practically complete and will shortly be occupied and operating. Since it began the manufacture of bodies the output has increased very rapidly, many buyers having their equipment supplied by the company. The company occupied its new offices early the present month, this department requiring rather more than 9000 square feet of floor space, which is pointed out as an evidence of Acme growth and progress. The company has added to its facilities a small but well equipped printing plant, which will produce all the small printed forms used in its records, and the literature prepared by the advertising department for the use of the sales organization.



New Office Building and Units of the Plant of the Acme Motor Truck Co., Cadillac, Mich., Just Completed and Occupied.

ended on semi-elliptic springs, the rear set being mounted in heavy hangers outside the frame. The relation of the rear axle is maintained by radius rods, which take the driving thrust and the springs take the torque stresses. The wheelbase is 144 inches and the tread is the standard 56 inches. The wheels are wood, artillery type, the forward set being equipped with solid band 36 by 3½-inch tires, and the rear set with 36 by five-inch tires.

The steering gear is located at the left side of the chassis, having unusual rake, and the control is by the usual foot pedals for the clutch and service brake, hand levers for regulation of the throttle and ignition system, and the gear shifting and emergency brake levers in the center of the footboard. The service and emergency brakes are both internal expanding, an internal cam type, the shoes operating within drums 16 inches diameter. The shoes are two inches width and this gives 201 square inches of braking surface to each pair of shoes. The brakes are fully enclosed, this protecting them from abrasives and road accumulations, prolongs the life of the facings and insures maximum efficiency.

The chassis is equipped with driver's seat, fenders, running boards, tool box, oil dash and tail lamps, mechanical horn, jack, tools and sight oil gauges and speedometer. The price of the chassis with stated equipment is \$2600 f. o. b. at Marion.

duced machines built from highest grade standard construction units, its sales and service policies have been sound and satisfactory, and the progression has been consistent with good business principles. The company built its own plant and when this and its facilities were inadequate it acquired the shops and equipment of the Cadillac Machine Co., which increases the floor area of the works to about 120,000 square feet, an addition of about 70 per cent. to the manufacturing space. The company is extremely well prepared for production, and it has adequate financial resources, now having total assets of approximately \$900,000, which are sufficient for all requirements.

Statement is made that the company's production facilities are excelled by very few other concerns, and that from the viewpoint of equipment the company ranks with the first 10 or 12 companies of the industry exclusively engaged in building power trucks. The company has extremely well equipped foundry and machine and structural steel shops, the last mentioned department producing all the truck frames and steel bodies and doing all the steel work on all bodies that had previously been done by the Cadillac Machine Co. In the machine

PATENT RIGHTS GRANTED.

Statement is made by the Defender Auto Lock Co., Detroit, that it has been granted patent rights in the United States and Canada which cover all claims for the Defender auto lock. This is a device intended to protect a Ford chassis against theft and it secures the ignition system so that it cannot be used. The patents include all details of the device, the method of grounding the system and locking the casing over the switch, as well as locking the coil box. The company is prepared to make prompt deliveries and expects to do so through the autumn and winter.

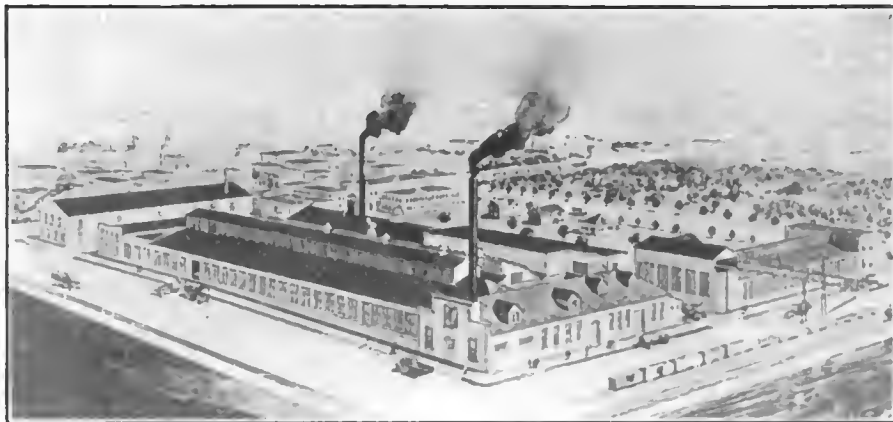
CONTINENTAL MOTORS ONLY FOR TRUCKS.

Statement is made that the mammoth plants of the Continental Motors Corporation, Detroit and Muskegon, Mich., which are the largest of the industry, and have produced a very large part of the power plants for automobile vehicles, will probably after Jan. 1 build no more engines for passenger cars, except to fill government orders. The company will confine its production to truck engines and to manufacture of materials to meet governmental requirements.

CHEVROLET MEN WITH COLORS.

Statement is made by the Chevrolet Motor Co. publication, the Chevrolet Review, that 1779 of its employees are now serving with the colors, and the number that makes this public has a cover decorated with hundreds of red service stars.

A quarterly dividend of 2½ per cent. on common stock was paid Oct. 1 by the Reo Motor Car Co.



Works of the Cadillac Machine Co., Cadillac, Mich., Recently Purchased by and Now Known as No. 2 Plant of the Acme Motor Truck Co.



Part of a Fleet of Acason Trucks, Ordered by Telegram, Loading at the Factory at Detroit for Delivery at the Hog Island Ship Yard.

AMERICAN RED CROSS USES CLYDESDALE TRUCKS.

The activities of the American Red Cross on the battlefields of Europe are wonderfully efficient. In fact the organization has added materially to the morale of the American soldiers because it can be depended upon to supply everything that the men require for their physical well being. But because of the import of military operations the wonderful work of the Red Cross has been subordinated in the information usually given to the public, and there is little realization of the magnitude of the greatest charity the world has ever known—for that is what this organization really is.

The Red Cross workers are everywhere and they are tireless. They are recruited from many nationalities, all engaged in the common cause for humanity, in striking contrast with the horrors of warfare. No better idea of Red Cross work could be conveyed than is given by the accompanying illustration, which shows two Clydesdale trucks "somewhere in France," manned by French and Sengalese soldiers, but bearing the inscription to show that they are a part of the equipment of the American organization.

This photograph was presented to F. C. Henderson of Boston, New England agent for Clydesdale trucks, by a French officer, who stated that while he was in active service he was stationed in a sector where 52 Clydesdale trucks were used by the Red Cross, these machines having been then in use about a year. The trucks had been through the battle of Marne and numerous other engagements, and they had been worked very hard, but so far as he knew the entire fleet was in service, although they had been worked almost continuously within range of German cannon.

The Wolverine Tractor Co., which was recently removed from Detroit to Saginaw, Mich., will shortly begin operations.

WILL BUILD NEW PLANT.

The Supreme Motors Corporation, Cleveland, O., has made contract with the Crowell-Lundoff-Little Co., Cleveland, O., to erect the first unit of a plant that is to be built at Warren, O. Work is to be begun immediately and as soon as the machine equipment can be installed production will be commenced. The company will manufacture war essentials, but following a cessation of hostilities it is to manufacture the series of gasoline engines that has been perfected in an experimental period of more than two years. The officers of the company are: President, A. W. Green, Windsor, O.; vice president and general manager, Charles H. Davis, Warren, O.; secretary, C. F. Erickson, Ashtabula, O., and treasurer, C. N. Mitchell, Cleveland, O.

The manufacturing plan of the Hart-Farr Co., Charles City, Ia., is to build 5000 tractors during 1919 if the labor and materials are obtainable.

The government is to erect buildings similar to those at the army cantonments to house munition workers at the Willys-Overland plant, Toledo, O.



Two Clydesdale Trucks in the Service of the American Red Cross in France. Manned by Crews of French and Sengalese Soldiers.

RUSH ORDERS FOR HOG ISLAND SHIPYARD TRUCKS.

The exigencies of the government must always be met, no matter what the other necessities may be and demands are made upon industries that would be believed impracticable under ordinary conditions. An example of these emergent requirements is shown in an accompanying illustration, which is from a photograph made at the plant of the Acason Motor Truck Co., Detroit, where a series of trucks are being loaded on cars for shipment to the Hog Island ship yard of the Emergency Fleet Corporation at Philadelphia. A telegram was received asking that the company ship a number of trucks immediately, and before the cars could be obtained the company had assembled the machines and they were in readiness for loading.

Acason trucks are standard equipment at this mammoth ship building plant and many of them are used almost continuously 24 hours a day. To keep to standardization the order was given and the company filled it without delay. Concerns manufacturing equipment or munitions must be prepared to deal with unexpected demands, and only by keeping up to, or possibly ahead of, scheduled requirements can deliveries be made to meet emergencies.

MICHIGAN CONVICTS MAY BUILD ROAD.

The Michigan Penology Commission will consider a proposition to construct an improved highway between the cities of Jackson and Grand Rapids, in that state, with convict labor. The route of the road as proposed lies through Ypsilanti to Grand Rapids to the Detroit highway, thence to Lansing, Portland and Ionia.

The new foundry of the General Motors Co. at Saginaw, Mich., when completed will employ approximately 1100 men.

Hoover, Head of Steel Ball Industry, Passes On

The death of Leander J. Hoover, best known as president and general manager of the Hoover Steel Ball Co., Ann Arbor, Mich., ended a life that was picturesque industrially, and the activities of a man who was reputed to have made America independent of the monopoly of German manufacturers of steel balls. Because of conditions resulting from the war a business that he established became in but little more than five years the largest of the kind in the world.

Mr. Hoover began work in Cleveland, O., when 13 years of age, for the Cleveland Machine Screw Co. He was employed by several concerns and eventually by the Standard Roller Bearing Co., Philadelphia. He had worked on grinding machines of different kinds, some of which were built for German steel ball makers. He believed in ball bearings, which were used in large numbers for bicycles and later for automobiles, and he studied methods that he believed might be practically applied in producing balls.

He was in Philadelphia for five years and with John J. Grant he engaged in steel ball manufacture at Merchantville, N. J., in 1907. After several years the business was removed to Philadelphia and the name changed to the Atlas Ball Co. Statement is made that he was the only one who had faith in the Hoover method of production and the future of the company. He was the engineer and he believed that the engineer should control the company. There was conflict and he withdrew. Then it was he went to the Flanders Manufacturing Co. at Chelsea, Mich., and when that concern discontinued operations he sought to establish a business to succeed it.

Obtaining capital was the chief problem. He had but little resources and after months of discouraging solicitation he interested others and \$75,000 was subscribed. The business was first established at Chelsea and was shortly after removed to Ann Arbor, where the

Hoover Steel Ball Co. began with a force of 41 workers. The success of the company was phenomenal. In 1914 the European war developed. America was unable to obtain steel balls from abroad and was forced to depend upon her own manufacture. Then the Allied nations wanted steel balls of all kinds. The Hoover company was given orders of astonishing sizes and since that time the company has been expanding its plant and increasing its production until it is now producing 30,000,000 balls a day, or the enormous total of 10,950,000,000 a year as measured by the standard of quarter inch balls.

The factory was increased from 30,000 square feet of floor space until it now has upwards of 120,000 square feet, and the force of workers has increased to more than 1200. The stock of the company increased from a par value of \$10 to a market value of \$190 a share, and the productiveness in dividends was in ratio. The men who invested their money in its establishment reaped a wonderful return.

Mr. Hoover interested himself in other industries. He organized and was vice president of the Parker Manufacturing Co., maker of chucks and arbors; he organized the King Trailer Co., of which he was president. He was president of the American Plug Co., president of the Ever-Tire Nut Corporation, Detroit; director of the Heath Carburetor Co., president of the Forge Products and vice president of the Mulkey Salt Co., Detroit. He was also financially interested in other concerns. The Hoover estate is invested in successful industrial enterprises, which are located either in Detroit or Ann Arbor.

The American Magneto Co., Toledo, O., formerly the Elkhart Magneto Co., is now in the hands of a receiver. On the report of the examiner will depend whether the company will be refinanced and operations resumed.

No further dividends are to be declared on the stock of the Chevrolet Motor Co. because of the decision to distribute its holdings of General Motors stock to stockholders and liquidate the company.

Case Trailer Units, All-Steel, for Heavy Duty

A series of all-steel, semi and four-wheel trailers is built by the J. M. Case Trailer Co., Grand Rapids, Mich., a concern that has the production facilities to build these units in considerable numbers. The trailer series consists of units having load capacities of three, four, six and 10 tons and pole semi-trailers in 3½, four and six tons sizes, the latter two having extension poles.

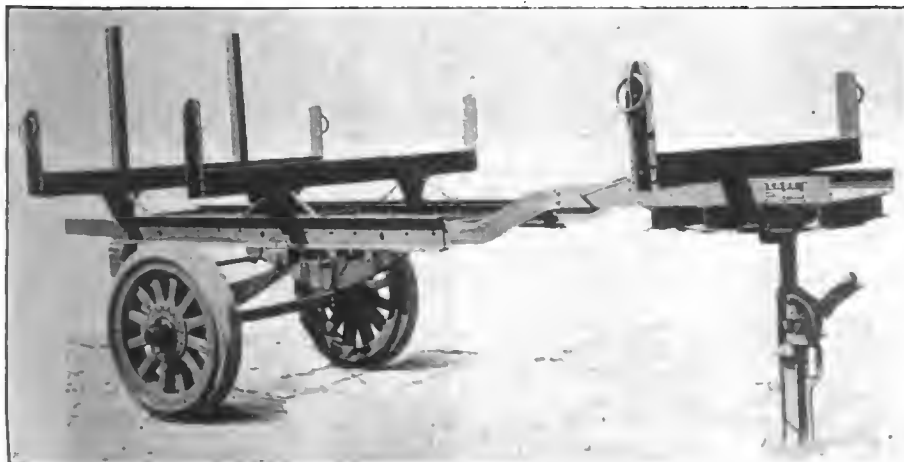
The extension pole trailers are a type designed for haulage of lumber, logs, poles, pipe and any lengthy material that cannot be handled safely or conveniently in other forms of vehicles. When telescoped the pole gives a wheelbase of nine feet, and when extended the wheelbase is 16½ feet, so that the extension is 90 inches, which insures the haulage of loads that could not be handled with any other equipment. The variability of the telescoping pole is a quality that is extremely convenient and useful in many works.

The semi-trailers are so constructed that they may be converted into four-wheel trailers by attaching specially built front wheel units. These units are in several sizes for use with semi-trailers of differing capacities. Each consists substantially of an axle, springs, wheels, tires, drawbar and steel turntable, upon which rests the circle of the semi-trailer, the king pin of the semi-trailer being locked in the center of the turntable. The drawbar is fitted with a spring shock absorber so that the stresses of starting and stopping may be compensated.

The frames of the semi-trailers and trailers are constructed of structural steel channels, with sturdy cross members, heavy gussets and reinforcements. The frames are mounted on semi-elliptic springs, the axles are large and fitted with Timken roller bearings, and the wheels are extremely strong and are shod with high grade solid band rubber tires. The trailer chassis are equipped with gravity discharge steel bodies when this equipment is desired. These are especially designed for the use of contractors and those who haul loads of loose material, where loading can be by gravity and quick discharge is essential to time economy. The units are well built throughout and designed for hard service.

The semi-trailer units are fitted with a lifting jack, which is claimed to be a decided improvement over anything built. It is a double-post type that can be operated by one man at either side of the vehicles. When not in use it is lifted and secured against the trailer frame, for it is permanently attached and it is always ready for use.

All of the plants of the General Motors Corporation are now working to capacity on war orders, according to a statement by President W. C. Durant.



A Case All-Steel Semi-Trailer, with Patented Pivoted Jack for Coupling and Uncoupling, Convertible to Trailer by Attaching Forward Wheel Unit.

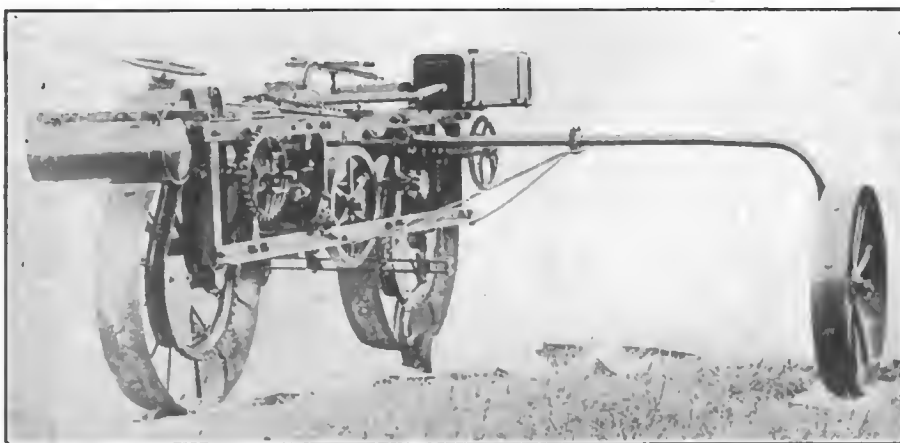
POWER FARMING WITHOUT LABOR

Synmotor Will Work Automatically in Contracting Circle, or If Hand Operated in Straight Rows

By Frank C. Perkins.

CONSTRUCTED to principles that are alike revolutionary of farm operating and agricultural implement design and use, the Synmotor, a power machine developed at Laurel Spring, N. J., is seemingly the pioneer of what has considerable promise of becoming automatic farm cultivation. The

resembles a large motorcycle, having a frame with a wheel at either end, in which is mounted the engine and the driving mechanism, and at right angle to this frame is an adjustable out-rigger, at the end of which is mounted a third wheel. The wheels are all metal and have wide rims, those in the main frame having cleats or spuds in the rims that



The Synmotor, an Automatic Power Implement That Is Designed to Operate in Circles, Controlled by a Wire Attached to a Center Post.

machine has been built with the very practical idea of use with and without operators. The first produced have been found extremely serviceable and useful. While what has been turned out thus far has been in one sense experimental, the results have been sufficiently satisfactory to justify the belief that they can be, in different sizes and capacity, do work very thoroughly, with mechanical precision when operated automatically, and when operated by an attendant they will be equal to other types of power implements.

The Synmotor may be steered by hand for plowing and cultivating straight rows, and with an automatic steering device it will do either work, day or night, without an operator. The claim is made that besides being an exceptionally good implement for hand steering, for plowing and cultivating field crops planted in straight rows, it can be used for other work for which power implements are not practical. For instance, it can be used to break crust and cultivate between drills of vegetable seed or grain after seeding and before the plants have grown above the surface of the ground and are visible. Statement is made that many crops germinate poorly because of a hard crust and lack of moisture and are frequently lost.

Synmotor a Three-Wheel Implement.

The Synmotor in general appearance

ence, just the width of the swath covered by the machine. From this drum a slender steel wire runs out through a guide pulley on a revolving arm to the steering lever on the cultivator—whether it is near or at the far side of the field. The wire fully controls the machine, even if it is started several hundred feet away from the post.

Operates Around the Center Post.

The Synmotor is started and moves in a circle around the post, gradually winding the wire around the drum. In other words, with each full circle around the post the wire is wound once around this drum, and this movement guides the machine the width of one swath nearer the post. Being perfectly tempered the wire cannot stretch and an electro-coated surface protects it from rust. The total weight of the wire is less than two pounds. Over 600 pounds pull would be needed to break it. It winds upon the drum absolutely the same each full circle of the Synmotor. Hence it establishes the location of the machine in any part of the field unerringly. The wire winds on the face of drum without kinking. When the implement has run as near the post as is practically possible to operate it, the drum is unlocked, the machine moved out of the field, the operator steering it by the hand wheel, the wire unwinding as it moves from the drum.

The four-foot swath may cover several



The Synmotor and the Control Post Set Up in a Field, the Wire Connecting Them Being Accentuated to Show the General Manner of Operation.

afford traction. When hand operated the Synmotor can be turned in very small radius and because of the out-rigger construction it can "straddle" rows of plants.

When operated automatically it is driven with the out-rigger wheel inside nearest to an operating post that can be located wherever desired. This post, which is shown in an accompanying illustration, is guyed with ropes or cable so it cannot sway. At the top of this post is a drum four feet in circumfer-

rows. If four rows, consider that if singly cultivated each row would have to be gone over separately, requiring four men, or one man four times to do the same work. Claim is made that the Synmotor does its work much more thoroughly than any hand machine, that it is absolutely accurate and follows its course with no perceptible deviation; that it does not unearth small plants and can be worked much closer to the rows; that further, one can plant rows as close as the plants can be practically grown

and then cultivate them as perfectly as if the rows were three feet apart.

Works Without Lighting.

The inventor of the Synmotor maintains that cultivation with it can preserve moisture and kill weeds from seeding time onward; that it can be operated at night without an operator during rush work, or when the ground is just right for plowing. One of the illustrations shows the accurate automatic steering of the Synmotor. A $7\frac{1}{4}$ -acre patch of cow peas and sorghum was seeded in drills by this machine and the growing plants cultivated, with only occasional inspection by the attendant during num-

Bessemer engine burns kerosene fuel. It is started on gasoline and when hot is switched to kerosene. This is important because of the permanent increase in the price of gasoline.

Larger Machines for Plantations.

In later designs some of the improvements to be added are hardened roller ball pinions and drive chains and a compact six-horsepower engine. This will give more room under the tractor for attachments and a lower tractor for orchard discing. An 1800-pound Synmotor has been developed to cover a seven-foot swath, for grain growers and for southern plantation work. It is designed to be worked on 10-acre areas, the operations being such that alfalfa or other permanent crops can be grown in the space between

square foot of land must pay a profit. This method, by permitting rows to be placed closer together and then given much better cultivation, makes the land yield much more heavily than it possibly could with wider rows and ordinary horse or hand cultivation.

The greatest expense in the operation of a market garden farm is the cost of labor, which is difficult to obtain in many localities at any price. The claim for automatic cultivation is that it is very economical as well as being thorough, and that there are no limitations of hours when there is work to do. There are other considerations, such as intensive operations that make ground areas as productive as possible.

The device that controls the automatic operation of the Synmotor is very interesting mechanically. This consists of a piston and a heavy helical spring operating in an oil filled cylinder, which is coupled to the rear end of the steering



Corn Planted in Contracting Circular Rows, Cultivated with a Synmotor.—Note the Accuracy of the Worked Ground Between the Continuous Hills.

erous nine-hour runs, some of which were completed after nightfall.

Automatic Work is Accurate.

The accuracy of automatic steering is remarkable. It has been certified to by many persons who have watched the machine in operation at Lawnside, Camden County, N. J. During many runs the space between the cutting steels and the drills of plants did not vary a half inch. Thus the implement proves its right to its name—Synmotor. Plants grown in closely spaced drills, such as onions and radishes, are not too difficult for cultivation, even in large acreage. It covers fields of growing plants with the speed of a two-horse cultivator and with the accuracy of a garden wheel hoe. It has driven through open furrows, chuck holes and sand filling, proving that the tractor and the steering wire will endure regular farm work.

With disc cultivator steels, disc scuffles and seeder points the Synmotor can be run all day and not gather trash. With spring shanks the steels cut clean over uneven ground and clay spots. The

the cultivated areas. Both the light and heavy machines have rear hitches for attaching standard makes of implements, such as potato planters, plant setting machines, seeders and orchard discs.

It is claimed that this implement is especially suited for operation by men not able to do hard all day work, and that it will be extremely useful on southern plantations where the intense heat lessens the work of man and beast.

Circular Cultivation is New.

The Synmotor method of automatic cultivation in circular rows is absolutely a new idea with market gardeners and vegetable growers. To this machine may be attached any tools required for cultivating, hoeing and hilling. The circular method of planting is new and is claimed to be of special value on intensively operated farms, where every



Center Control Post for a Synmotor Equipment, Showing the Stationary Drum Partly Wound with Wire and the Swinging Arm and Guide Pulley.

lever, and this maintains an even tension on the wire that is attached to the forward end of the lever and wound on the drum in the center of the circle that is worked. The piston cannot be obstructed and its action is positive.

The Synmotor is claimed to do its work for very small cost. For average cultivation the consumption of fuel is about a half gallon an acre and with reasonable care the expense of upkeep and maintenance will be relatively low. When driven by hand plowing can be done to a depth of $6\frac{1}{2}$ inches with a single Syracuse No. 51 plow, and that it will do good work in sod or stubble, or in heavy loam land, after rain has soft-

ened it, and where the ascending grades are not more than eight feet in 100. The plow is attached to the gang bar and the equipment becomes a riding plow with an automatic lift. A disc coulter or marker is attached to the left end of the gang bar and marks a line by which to steer for the next furrow.

With this equipment short turns can be made at head lands, the same as with horses, for the plow can be lifted after the first quarter turn and dropped before the second quarter turn is made, so that head lands can be worked to within six feet of a fence or wall. The out-rigger is adjustable to six feet, and the gang bar may be extended at the left side for straddle row cultivation.

FOREIGN TRADE RECORDS BROKEN IN AUGUST.

The imports into the United States in August were valued at \$273,000,000, which was \$5,000,000 more than in the corresponding months of 1917 and \$31,000,000 more than in July, 1918, the total for the first eight months of 1918 being \$2,060,000,000.

The exports for August were valued at \$529,000,000, a gain of \$41,000,000 over the same month of 1917, and \$29,000,000 more than in July, 1918. The total exports for the first eight months of the year were valued at \$4,012,000,000, which was a decrease of \$138,000,000 as compared with August, 1917. The eight months shows, however, a trade balance of approximately \$2,000,000.

GMC-SAMSON TRACTOR.

The plants of the tractor department of the General Motors Truck Co. at Stockton, Cal., and Pontiac, Mich., are each producing an average of five tractors a day. At the Samson Iron Works, Stockton, as high as 150 Samson Sieve-Grip tractors have been built a month. At Pontiac the plant is to be enlarged and the production increased considerably. But one model or size machine is now built, but several sizes and possibly more than one type will later be constructed.



A Special Ambulance Body on a Dodge Truck Chassis, a Type Built to Order by the Colt-Stratton Co., New York City Distributor of Dodge Vehicles

WHAT A TRUCK LOAD MEANS.

The power truck is purely a machine that has great possibilities if it is used. By this is meant if used to the greatest degree of its productivity, which is carrying freight. If loads can be carried all the time the truck may be regarded as 100 per cent. productive. If used for haulage in one direction only the productivity shrinks to 50 per cent., and the majority of owners have worked their vehicles in their own service and have very rarely reached the 50-50 mark of maximum efficiency.

This is not because the machine has not capacity or speed or endurance. The reason simply is that the owner does not have the work. In other words, he can normally carry a load in one direction only.

In contrast with this condition is that of carrying partial loads, which still more reduces the "pay mileage," and again there are those who believe that they are making money when they overload.

According to W. F. Melhulsh, president of the Fulton Motor Truck Co., Farmingdale, L. I., the truck manufacturers of the country should assume the task of teaching truck owners the importance of so operating their machines that the greatest measure of efficiency should be obtained. Mr. Melhulsh maintains that truck owners should be taught to realize that they only can work machines efficiently, and that whatever the loss may be through neglect they must endure it because of their own negligence.

VORMELKER WITH RUSSEL.

The Russel Motor Axle Co., Detroit, has appointed Fred W. Vormelker its efficiency engineer, and he is now directing all activities of the time study, routing, factory time, employment and efficiency departments.

A considerable addition to the plant of the Locomobile Co. of America at Bridgeport, Conn., to increase the production of government work by that company, has been planned.

Packard Co. National Truck Economy Awards

The judges are now examining the tabulations of the records made in the national economy competition organized by the Packard Motor Car Co., Detroit, which was concluded Aug. 31. Determinations cannot be reached until every record has been compared and the best results learned, but there is probability that the findings will be made known by the end of the present month.

In organizing this contest, which was open to all owners and drivers of Packard trucks, the machines were placed in three classes, according to load capacity. The owner award of each class was fixed as \$1000, and there were three driver awards for each class, these being \$500, \$100 and \$75. In addition to this a number of Packard agents offered additional awards for drivers in their territory, and several owners of fleets of trucks encouraged their drivers by offering awards for them besides those specified by the company and the agents. The total of the company awards was \$5025 and of the agents \$3050, or a total of \$8075 that will be distributed by the decision of the judges.

Each competitor was required to keep daily records on forms of the National Standard truck cost system, and at the beginning the competitors consisted of 1038 owners and 1857 truck drivers. The total number to submit complete records, covering the three months from May 31 to Sept. 1, was 1760. These deal with mileage driven, tonnage carried, operating, repair, maintenance and overhead cost, and the basis of award will be the lowest mileage expense a unit, both for owner and driver.

DODGE ARMY AMBULANCE.

Dodge Brothers, Detroit, which for several years produced only passenger cars, and which has for a considerable time built a light truck chassis, has delivered a very large number of machines intended for officers' cars and ambulances to the government, these being used exclusively for army service. The truck chassis is used for ambulances. Recently the Colt-Stratton Co., the Dodge agent in New York, built a special army ambulance body and installed it on a truck chassis, this being to the order of a buyer who wanted to give the vehicle for Red Cross work. The accompanying illustration shows this machine as it was equipped prior to delivery. It is attractive largely because it is obviously designed for service and efficiency.

The Ford Motor Co., Detroit, is said to have contract to build 10,000 small tanks, the two-man type, which have been tested and found to be exceedingly satisfactory for some forms of military operations.

POWER TRUCKS IN FOUR LOAD SIZES



Leslie B. Acton, President of the Power Truck and Tractor Co., Detroit.

PRODUCTION of four sizes of power truck chassis is the manufacturing plan of the Power Truck and Tractor Co., Detroit, a concern organized with capital of \$2,500,000, that has acquired a plant of considerable size at Beard and Goldsmith streets, in that city, and has already begun manufacture of the machines. The company's officials are Leslie R. Acton, president; L. P. Helm, vice president and engineer; Howard W. Walton, director of sales, and George L. Brush, secretary and treasurer.

These men are well known and have been identified with the industry and several enterprises for a considerable period of time. President Acton has been associated with different concerns for years, his experience including service as auditor and assistant treasurer of the Studebaker Corporation, production manager of the Maxwell Motor Co. and vice president of the Redden Motor Truck Co. Vice President Helm was formerly vice president and general manager of the Wisconsin Motor Truck Co., Milwaukee, Wis., and later director and engineer of the Olympian Motors Co. Secretary-Treasurer Brush has been active in the industry for 12 years, serving as office manager for the Studebaker Corporation, secretary and treasurer of the Universal Motor Truck Co., Detroit; sales manager of the Maxwell Motor Co., Ltd., of Canada; sales manager of the Harroun Motor Co., Ltd., of Canada, and sales manager of the Eigin Motor Co., Ltd., of Canada. Director of Sales Walton has been during the past 10 years general sales manager of the Universal Motor Truck Co., Detroit; district sales manager of the Lippard-Stewart Motor Truck Co., Buffalo, and assistant general sales manager of the Signal Motor Truck Co., Detroit. The engineer of the tractor department of the company is F. W. Thomas, a graduate of the Swansea

Technical College, Wales, England, who was manager and designer for the Sandusky Tractor Co., and is known as a skilled tractor engineer and builder.

Chassis Carefully Experimented.

The company has been organized practically a year, but for a considerable period before organization it existed for experimental and development work. The first unit perfected was the one-ton chassis, one of which has been used for more than a year and a-half and it has been found to fully meet the expectations of the designer, with reference to consumption of fuel and lubricant, tire wear and other factors of operating cost. In general the chassis was believed to adequately meet the requirements of business men.

The designs developed were for two chassis, these differing only in that the smallest size of four load capacities has a three forward speed ratio gearset, and the other three sizes have four forward speed ratios. In general characteristics the chassis are practically the same, but they differ in the proportioning of the construction units and assembly parts. The purpose of the company is to produce chassis from units made by specialists. Statement is made that the units have been very highly perfected, have been proven by long service experience, are well understood by power vehicle mechanics and are known well to many thousands of motorists. Having qualities that have been established and recognized there is belief that machines so constructed will be understood by buyers and there will be the advantage of having the reputations of the units as the foundation on which to establish the business of the company without extended educational work.

Constructed of Standard Units.

In assembling the units endeavor was made to obtain accessibility and simplicity so that there would be minimum labor necessary for care and attention and maintenance. The units were chosen with the view of operating the vehicles at low cost with reference to fuel, lubricant and tires, and having abundant factors of safety in every detail. All the machines are conventional

in construction. They have four-cylinder, four-cycle, water cooled power plants combined with the clutches and transmission gearsets, and the power is transmitted by long shafts to worm shaft and worm wheel rear axles.

The chassis are constructed to have load capacities of 2000, 4000, 7000 and 10,000 pounds, and these in the same order of rating have wheelbases of 144, 150, 168 and 180 inches. The 2000-pound chassis is constructed with a Continental engine having cylinder bore of 4½ inches and stroke of 5¼ inches, that is rated by the S. A. E. formula as developing 27.25 horsepower, but which will produce considerably in excess of this. The engine is a standard type with the cylinders cast en bloc, with all valves operated by a single camshaft.

The clutch is a dry multiple disc type that is combined with the Brown-Lipe selective sliding gear transmission gearset and the engine into a unit power plant that is suspended at three points. The engine is lubricated by a combination force feed and splash system and it is cooled by a circulation of water through a cellular type radiator with cast top and bottom tanks, the top tank being finned to obtain better radiation. The fuel is supplied through a Stromberg carburetor and the source of ignition current is an Eisemann magneto. The drive is through a single shaft to a Timken worm shaft and worm wheel rear axle, the propulsion is through radius rods and the torque is taken by a torque arm. The steering gear is a Ross construction and the brakes are the Timken dual type internal expanding, operating within drums on the rear wheels. This chassis is not equipped with lighting or starting systems.

Three Larger Chassis to One Design.

The 4000-pound chassis has the same size power plant as the smallest size truck, but this is combined with a similar clutch and a Brown-Lipe four forward speed ratio transmission gearset. Aside from larger units and parts the chassis is the same as the 2000-pound machine.

The 7000-pound and the 10,000-pound



The Power Two-Ton Truck Chassis, Built to a Standard Design for a Series of Four Machines, With Complete Equipment.

chassis have the same size power plant, this being a Continental engine with cylinder bore of $4\frac{1}{4}$ inches and stroke of $5\frac{1}{4}$ inches, which is rated by the S. A. E. formula as 32.40 horsepower, but which will develop approximately 45 horsepower according to the claim of the manufacturer. These are the well known model E engines, that have the cylinders cast in pairs, with the valves operated by a single camshaft. The engine is cooled by a centrifugal pump that circulates water through the cylinder jackets and a radiator of the same type used on the smaller chassis, and the lubrication is by double vertical plunger pump driven by eccentrics on the camshaft that forces oil to the timing gearset and the rear main bearing, the drainage from these filling the oil troughs from which the other moving parts are lubricated by splash. The carburetor is a Stromberg and the magneto is an Elsemann.

Power Transmission System.

Combined with the engine is the dry multiple disc clutch and the selective sliding gear Brown-Lipe transmission gearset, having four forward speed ratios and reverse. The power plant is mounted at three points to insure it

against the cramping of chassis distortion. The power transmission system, like the smaller chassis, is through a single tubular shaft with a universal joint at either end to a Timken worm shaft and worm wheel rear axle, this unit being the conventional type and designed for heavy duty. As with the smaller chassis the propulsion is through radius rods and the torque is taken by a torque arm, this thoroughly protecting the axle against all stresses.

The frames of all the chassis are constructed of pressed steel channel section with heavy cross members and gusset reinforcements, and these are mounted on semi-elliptic springs. The steering gears are Ross units. The controls are all conventional, including the usual clutch and service brake foot pedals, the ignition and throttle levers on the steering wheels, and the gear shifting and emergency brake levers at the center of the footboard. The brakes are the same as those of the smaller chassis, both internal expanding, operating within drums on the rear wheels. All chassis are equipped as is shown in the accompanying illustration, which is of a 4000-pound machine and is typical of the general construction.

Two Types of Farm Tractor.

The farm tractors that the company is to build are to be of two general types, which will be four-plow capacity, and will have four-cylinder power plants installed transverse of the main frame. The one will be a four-wheel machine that will be driven by the rear wheels, and the other will be a tracklaying type that is intended for service where the ground is soft, sandy or marshy. Both of these are to be equipped for belt work. One of these is expected to be especially suited for work requiring high clearance, where crops are frequently cultivated, and to have utility where machines with less clearance would not be as practical or as useful.

The company purposes to have a comparatively large production of both trucks and tractors, but the output of both will depend very largely upon the supplies of material that will be allowed by the Priorities Committee of the War Industries Board, which will make rulings that will apply to both the classes of machines. The company has proceeded to develop a sales organization and statement is made that this has been considerably advanced for both the truck and the tractor departments.

Truck Equipment for Road Building a Big Economy

When the United States engaged in war with Germany and every endeavor was made to prepare for participation in the operations overseas, mobilizing men and training them as soldiers was imperative. To train men cantonments were necessary. The cantonments were built in remarkably short periods, but before work could be begun material, tools and supplies of all kinds were needed. These cantonments were in fact small cities built of wood, but having in most instances sewerage systems, water supplies, heating and lighting plants, streets, roads, walks and practically every necessity for the protection, convenience and comfort of the soldiers.

Whether or not the cantonments were served by railroads roads were necessary, not only to every part of each reservation, but to the different towns

or cities adjacent. Some roads existed and improvement was needed to provide for the heavy traffic. In many cases new roads were constructed. Where there was greatest need of new roads was in the South. A considerable number of the camps were in the southern states and the state and county authorities had to develop organizations and obtain facilities that would keep the work ahead of the cantonment construction. Power trucks and road building machinery were procured and highways were worked with almost unbelievable speed.

Where road improvement had been planned and equipment was available the demands were met even more quickly and with admirable results. An example of conditions and work accomplished is in Cumberland county, North Carolina, where for several years the highway commissioners have been engaged in constructing a system of roads. The commissioners a year

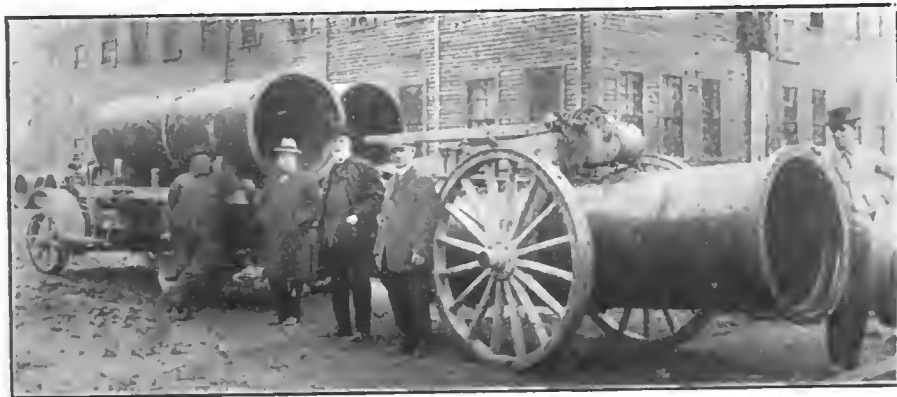
ago bought a $3\frac{1}{4}$ -ton Federal truck and operated it with a trailer of equal capacity hauling road materials and for drawing road grading and scraping tools. Because economy was sought the equipment was chosen with much care and good facilities were provided for loading. The haulage units are a quick discharge type. A careful record was kept of the work and the cost.

After four months the commission bought a second truck of the same size and used this for similar work. The first truck is shown in the accompanying illustration at the loading bin of a stone crusher and the second is shown hauling a road grader. When an artillery cantonment was established at Fayetteville all the energies of the commissioners were directed toward developing new roads, and the equipment was increased by purchase of three more $3\frac{1}{4}$ -ton Federal trucks, one of which has been delivered.



Two of the Fleet of $3\frac{1}{4}$ -Ton Federal Trucks Operated by the Highway Commissioners of Cumberland County, N. C., for Road Construction: At Left, Operating a Road Grader; at Right, Truck and Trailer of Same Capacity Loading at the Bin of a Stone Crusher.

Semi-Trailer Equipment for Hauling Large Water Main Sections



Truck with Semi-Trailer with Chain Winch on Pole, Specially Designed for the Haulage of Main Pipe by the Lynn, Mass., Water Department.

Handling large, bulky or heavy objects is always practical provided that equipment is available. Where work is not continuous facilities cannot be provided save at considerable expense, which the saving would not justify. Iron water main sections are probably as difficult material to transport as might be instanced because they are heavy, cannot be loaded or unloaded without special means to handle them, and usually they are distributed along lines of con-

struction.

The water department of the city of Lynn, Mass., recently extended its water mains and this necessitated laying 48-inch pipe a distance of about seven miles. The main was received by vessel and lifted to a pier by derricks. Once the work was begun there was every reason why it should be as nearly continuous as possible. The pipe was hauled from the pier and placed in the streets and highways near to the place

of laying.

The pipe was hauled on platform trucks having cradles that would hold two sections of main side by side. These could be loaded by block tackle and skids, with which they were rolled from the deck of the dock to the truck, or lowered from the truck to the street. Loading and unloading was slow, however, until a truck equipped with a power winch was utilized, when the time was greatly reduced.

Two sections of main were all that could be carried, but the belief that the trucks could haul greater loads led to the use of a special trailer with a high arched axle, with a chain winch operated by a long lever mounted above the pole. The trailer was designed purposely for handling water main, but it could undoubtedly be used for hauling very heavy material of such length that it could be slung from the axle and the pole.

The trailer could be hacked over a main section, the chain sling lowered, and with the winch the pipe could be raised and the lever secured. The forward end of the section could be made fast, and the truck was ready to start. Then the load was three main sections and the time of haulage could be reduced practically a third, for the trailer could be loaded far more quickly than the truck. The accompanying illustration shows the truck and the trailer loaded at the pier.

Special Type of Truck Body for Haulage of Long Structural Steel

The load that can be carried by a power truck theoretically should have the lowest possible center of gravity and be so placed in the body that the weight will be carried on each of the four wheels in the proportions or ratios the designer intended. But with the limitations of body length and width, any great variance from what may be termed the load center will cause excessive stresses upon some parts of the chassis.

Heavy, compact freights can be handled easily as compared with those that are extreme length. Long timber, pipe, poles, or any material that will considerably overhang the rear end of the body will, if of sufficient weight, lift the forward end of the chassis, or it may so balance the truck on the rear axle that steering is uncertain and dangerous because spring movement, for instance, may raise the front wheels above the roadway.

The only certain way of preserving a load center, if the material handled is of unusual length, is to elevate the forward end above the driver's cab or seat, which may be done by temporary or permanent structure. A possibility of body equipment of this type is shown in the accompanying illustration, which is of a large Packard truck, owned by the New England Structural Co., Boston and Everett, Mass., hauler of steel buildings and bridges. As will be noted this has a wide platform on which at the forward

end, extending above the height of the cab, is a steel frame, and the heavy metal is carried resting on this and the rear end of the platform. The load can extend forward or back, the limitations being the clearance of overhead con-

struction in the highways and the surface of the ground.

An extension has been agreed to by the holders of notes of the Saxon Motor Car Corporation, Detroit.

The Federal Motor Truck Co., Detroit, has declared a two per cent. dividend on common stock.



Packard Truck with Platform Deck and Frame Designed for Haulage of Heavy Steel Materials for the New England Structural Co.

RED CROSS WANTS VOLUNTEERS



Entrance to Camp Scott, Chicago, Where Red Cross Volunteer Drivers and Mechanics Are Trained for Service Overseas.

DEVOTED to the relief of humanity suffering from any cause the work of the American Red Cross, which may consistently be termed the greatest charity the world has ever known, has increased almost beyond the comprehension of the average mind. The activities of the Red Cross are associated with the battle field, but this is but a part of what it has undertaken. Wherever there is need the Red Cross is always represented and its charities are bestowed upon all without regard to race, nationality or creed.

The American Red Cross is wonderful as an organization. Wherever warfare, disaster, famine or pestilence has caused injury, hunger or sickness, the Red Cross is regarded as the logical means of affording relief. It is doubly wonderful from the fact that its resources are given voluntarily by those who have confidence in its integrity of purpose and the wisdom of its benevolence. Its principal workers are all volunteers, who contribute their services because of the realization that they are directly benefiting mankind.

The Red Cross represents charity in its broadest sense. No matter what the emergency, its organization has always been found adequate to the needs. Without hesitancy all the people of the United States have supplied the funds and the workers have volunteered in numbers sufficient to afford quick and efficient relief.

When the European war begun the American Red Cross joined with other Red Cross bodies and distributed its charities wherever there was need. Because military operations were of magnitude never before undertaken needs were enormously increased. The Red Cross required millions where it has needed thousands in money and thousands of permanent workers where but small

forces, serving temporarily, were necessary.

Wherever war operations developed the Red Cross followed the flags. When the United States declared war and the American soldiers joined with the Allied nations on foreign soil, the needs of the Red Cross increased immeasurably. Appeals for funds and for workers were made and were met with a spirit that was as patriotic, as was evidenced by those who carry the colors—a ways forward and never

backward to the victory that is certain to reward American unity and valor.

The Red Cross now has thousands of workers overseas. It has an organization perfected that is marvelously efficient. The relief it affords cannot be measured by terms that can be comprehended by the average mind, because values are represented by lives saved, by suffering relieved, by comfort bestowed and by gratitude that at best can only be expressed in words.

The policy of the Red Cross has been to ask the people to contribute money and to appeal to those who wish to participate in the noble and unselfish work that is so universally needed. There are, of course, many thousands who because of conditions and lack of resources would not be able to give their services entirely without compensation, and to those who will serve in differing capac-

ities the Red Cross gives such pay as it consistently can.

The Compensation for Services.

The compensation for activity in Red Cross work is not what is paid in money. It is the knowledge that one is serving one's country and its cause just as patriotically, just as earnestly and just as devotedly as though one was with the flag. And thousands of the Red Cross workers are with the colors, serving on the battle field and doing their part as fearlessly and as nobly as those who man the artillery or tanks or aircraft; as those who in the trenches and on the open field bear the brunt of the assault or the attack; as the men who are combating the seas in destroyers or standing at the guns of the battleships awaiting the appearance of the German fleets in the open.

True it is that they do not bear arms, and they are not combatants in the sense that they win victories, but they are just as much a part of the great American army that is battling for Liberty across the seas as though they wear the khaki and insignia of the world's greatest republic.

The constant flow of American troops overseas, the gradual growth of the Allied armies, and the almost continuous conflict since early last spring has made demands upon the Red Cross that can only be met by volunteers for service for the duration of the war. The American army inspired the Allies with new valor, its example and invincible spirit has turned the tide that is now sweeping across France and Belgium, and will not be stayed until Germany has been forced to submit and the menace to the security of all the nations of the world has been dissipated forever.

Red Cross Wants Volunteers.

The American Red Cross wants men who can drive and who can serve as automobile mechanics for service in France. It wants men who are willing to serve their country and the cause of



Drivers and Mechanics Training for Red Cross Service at Camp Scott Driving a Truck Through a Stretch of "No Man's Land."

humanity until there is no longer need. It wants men who will make the sacrifice of their time and endeavors because of the common reward for mankind. And it needs these men more urgently than words can imply when seen in printed form. The Red Cross organization is superb. It is not willing that men shall engage in work abroad unless they are trained and equipped for specific service. The volunteers for Red Cross drivers and mechanics are needed for the transportation department, that division that delivers the supplies from the bases to the field and line hospitals, that conveys the wounded and sick from the front to the rear.

All men who respond to the appeal are sent to the base at Chicago, where the Red Cross Automotive and Mechanical Bureau is located. A training camp and barracks known as Camp Scott has been established at 6046 Cottage Grove avenue, which is commanded by Major H. P. Harding, a well known automotive engineer of Chicago. That the men can be sent overseas as quickly as possible and at the same time fit them so they can do their work intelligently and well, a rigid course of training, continuing about four weeks, is given.

How Volunteers Are Trained.

The volunteers are uniformed and they are trained to discipline that will be beneficial to the service and to themselves. At the barracks there is a complete automotive shop, where cars and trucks are assembled and reassembled. This work is directed by competent instructors, and besides the assembling and study of all mechanical functions the men receive demonstrations of all probable accidents and failures and are taught the quickest methods of determining the cause and making restoration.

Grounds have been laid out on which men are taught to drive trucks and cars through, around or over obstacles. Some of these sections represent conditions that might be expected in No Man's Land. Large pits, for instance, resemble shell holes; piles of brick and debris are spread over the paths or tracks and the men are required to drive at certain speeds with certain loads through these paths before they are given ratings as drivers.

Lectures and Actual Work.

The men are taught by series of lectures by leading engineers of the automotive industry. The subjects are taken up systematically. Men who are managers and the heads of large enterprises give their time to teaching the men what they ought to know of theory. Some of these engineers are authorities. Others are connected with some of the largest specializing concerns, the makers of bearings, carburetors, magnetos, ignition systems, tires, etc., and other authorities lecture on topics that will prepare the men for the work, and make them self-reliant and resourceful. From time to time Red Cross officials address the men and give them first hand information of the service they are to engage in and what will be expected of each volunteer. Each week every possible

damage from breakage or failure of a truck or car is covered by lectures and actual field demonstrations.

The men daily engage for several hours in repair work of all kinds and in some instances building new cars. The Red Cross has made arrangements with about 100 garages and repair shops in Chicago so that the men will have the best kind of intensive training under highly competent instructors. The work is graded and marks are given daily, the methods of grading being the same as is used in technical schools.

These garages display signs that read as follows:

All Repair Men and Mechanics
In This Garage Are
RED CROSS MEN
Training for Overseas Duty.
Stand by the Colors.

Nominal charges are made the public for the work that is done by the volunteers, which are turned in to the Red

are required only for business purposes there can be no reason to include them in the request for general fuel economy.

There is no question, however, that the owners of trucks can economize gasoline if they will give the same attention to the consumption of fuel that they do with the passenger cars they own. Drivers are proverbially negligent. The best economy is obtained by a careful checking of mileage and the volume of fuel burned.

TARVIA USES ON PRIVATE ESTATES.

An extremely interesting booklet has been prepared for the Barrett Co. by the Erikson Co., advertising counsel, New York City, which is devoted exclusively to the illustration of uses made of Tarvia in constructing drives and walks on private estates. There is some description of the manner of application and the results obtaining, but the great



Red Cross Volunteers at Camp Scott Making a Repair in the Field, a Part of the Work Done During the Training Period.

Cross and the fund used to purchase additional equipment. While the men are overseas they are paid \$40 a month and maintenance, and while training they receive half pay and maintenance. On the date of embarkation for Europe the men each receive a paid up insurance policy for \$1000. The department is open to men under 18 years and more than 45 years of age, or for those rates in registration classes 5, 4, 3 and 2.

GASLESS SUNDAYS SUSPENDED.

Owners of passenger vehicles may use them Sundays, the order for suspension of Sunday riding being revoked after Oct. 12. The Fuel Administrator, however, plans to ask owners to reduce the consumption of fuel approximately 20 per cent., and this will place them upon their honor to economize at least to the ratio stated.

There has been no suspension of the use of trucks on Sundays, but as these

er part of the pamphlet is given over to illustrating drives and roadways about residences and private clubs in different sections of the country. The properties are both large and small and the effect of smooth and dustless roads is interestingly presented by a series of admirably chosen subjects. The publication may be obtained from the Barrett Co. through its New York office or its numerous branches.

Additional machine tools have been ordered by the Buick Motor Co., Flint, Mich.; the Ford Motor Co., Detroit, and the Nordyke & Marmon Co., Indianapolis, Ind., for increasing their production of government orders for Liberty engines.

The Champion Ignition Co., Flint, Mich., is to make an addition to its plant that will cost approximately \$30,000.

Competitive Test to Prove Value of Truck for Road Construction Work



Road Commissioners of Colusa County, California, Testing a Denby Truck in Buying Competition with Four Other Makes by Hauling Big Scraper.

Competition is not a novelty to determine physical capacity or qualification, but it is unusual as applied to vehicle buying. The highway supervisors of Colusa county, California, this year are expending a considerable appropriation in road improvement and when this work was in prospect and equipment was to be

bought power trucks were regarded as necessary. The supervisors were willing to pay whatever price was necessary to obtain the best make of machine, and they were willing to accept whatever was proven to their standards to be best suited for the work.

A decidedly uncommon test was pro-

posed to make choice from five different makes of trucks. Each was to haul a large road scraper that ordinarily was drawn by a team of 12 horses on a section of highway at Maxwell, and the supervisors were to determine which was the most satisfactory. Statement is made that but one of the five, a five-ton Denby chassis, hauled the road scraper to a standard that was approved by the supervisors. The accompanying illustration shows the county officials walking beside the truck, observing the work. The result was regarded as a very good demonstration of the efficiency of the internal gear drive, for no load was carried on the chassis to give traction.

CHANDLER GETS ANOTHER TRACTOR ORDER.

The Chandler Motor Car Co., Cleveland, O., has received an order for about 1300 tractors that is supplemental to the original order for 2000 tractors, or a total of 3300 machines. The total value of the orders is stated to be approximately \$16,000,000. The tractors are a tracklaying type, weighing close to 10 tons each, that are used for artillery haulage. The company will produce approximately 1000 tractors this year and the remainder of the orders will be built the coming year.

Economy of Convertible Bodies for Tractors for Municipal Service

The residents of communities of large proportions exact a very large degree of public service from municipal governments. This is no doubt based on the belief that the people as a city can obtain collectively, or perhaps unitedly, what would not be otherwise practically possible because of expense.

These increasing demands, or cost, impel economies wherever practical, at least without lessening the character of service. This statement applies specifically to municipal sanitation, which includes street sweeping, sprinkling and flushing, removal of ashes and garbage, snow removal, cleaning catch basins and

work of like character that necessitates the use of differing forms of bodies.

When horse vehicles were used equipment usually consisted of separate units for each work. With power vehicles one type chassis with several bodies, which can be converted to practically any purpose, afford the greatest degree of economy and efficiency. These have an elasticity of service that is at times exceedingly desirable, as in summer when cleaning and flushing streets is necessary, and in winter when snow removal must be as quick as possible to minimize traffic congestion in cleared thoroughfares.

The street cleaning department of New York City has equipment that is seemingly giving a very large measure of economy. This consists of a series of Mack truck chassis for which tanks adapted for sprinkling and flushing and enclosed steel bodies with automatic hoists to obtain quick discharge by gravity have been provided. The service equipment can be changed in a few hours whenever necessary and the chassis can be used continuously throughout the year.

The accompanying illustrations show a chassis used during the summer months for street flushing and during the winter for removing ashes and garbage. The expectation is that the decreased expense of service will more than offset the larger initial expenditure, and the people will largely benefit from the decidedly better service.



With Convertible Equipment the Mack Chassis Owned by the New York City Street Cleaning Department Is Always 100 Per Cent. Useful. At Left, with Tank for Flushing and Sprinkling; at Right, with Enclosed Steel Body and Hydraulic Hoist for Ash and Garbage Removal.

MOTOR TRANSPORT CORPS NEEDS INSTRUCTORS.

The Motor Transport Corps of the War Department wants to obtain the services of 200 men who can serve as instructors, who can earn commissions as officers. The men required in the call issued may be within or above the draft age, and technical knowledge is secondary to instructive ability. Minor physical defects will not debar those who have the mental qualifications.

The purpose of the corps is to establish 10 new schools at army camps and the instructors will be headed by experienced men who have served in Europe. The number of men required may be realized when one understands that 5000 officers, 30,000 non-commissioned officers and 120,000 men will take the training course. Because of the very large number to be trained the time given to each class must be short and the instructors must be men who can practically teach classes.

MACK NOW HEAD OF HOOVER STEEL BALL CO.

W. C. Mack was elected president at a meeting of the directors of the Hoover Steel Ball Co., Ann Arbor, Mich., to succeed Leander J. Hoover. F. A. Stivers was made vice president, M. J. Fritz was continued as treasurer, and Secretary H. D. Runciman was made general manager and a director. William A. Arnold, Jr., will continue as assistant secretary. The above named officers and R. T. Dobson, L. P. Hall and H. W. Douglass are the directors.

The directors voted to obtain a license to use the Hoffman patents for steel ball manufacture from the Atlas Ball Co., Philadelphia, which license shall run the life of the patent. The patent was acquired to strengthen the company and afford it a degree of protection that was considered desirable by the directors.

RUBBER IMPORTATIONS ARE UNCHANGED.

The volume of crude rubber that may be imported into the country for the last three months of the calendar year will be the same that has been permitted for the previous nine months, or 25,000 tons for October, November and December. The total fixed for the year is 100,000 tons, and of this approximately 25,000 tons will be from South America.

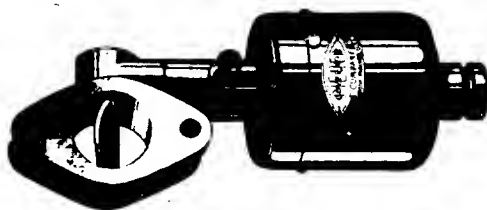
Thomas J. Little, Jr., engineer of the Lincoln Motor Co., Detroit, has been appointed a member of the welding research committee of the Emergency Fleet Corporation of the United States Shipping Board. He has been investigating gas and electric welding in all American plants producing Liberty engines.

The Biggam Trailer Co., Corunna, Mich., is now producing an order of 5000 trailers for the Quartermaster Corps.

PIERCE GOVERNORS USED ON 89 MAKES OF TRUCKS.

Statement is made by the Pierce Governor Co., Anderson, Ind., that Pierce governors are now standard equipment with 89 different makes of power trucks, and that during the present year about 12,000 instruments will be furnished for government uses.

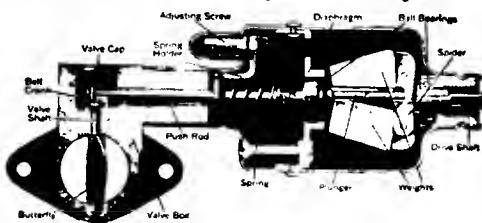
The Pierce governor is a self contained type, being in a small housing, and it is designed to utilize the centrifugal force of variable weights carried on a shaft to control the fuel supply. The only rotating part of the governor is the weight spider, which is mounted on ball bearings in an oil bath.



The Pierce Governor, Showing the Valve Box Fitted Into the Intake Manifold.

The governor is mounted between the carburetor and the intake manifold and may be connected to the driving agent by either a solid or a flexible shaft. In the governor valve box the butterfly valve is normally in a position that does not obstruct the flow of gas, but it is closed so as to reduce the valve port area just as soon as the motor reaches a predetermined speed.

The valve is actuated by what is known as the flyball principle. Two weights are carried on a spider that is on ball bearings, and these are so pivoted that as the velocity increases and they are swung outward they force a plunger forward that in turn actuates the butterfly valve. The plunger is forced against a spring calibrated to standard pressure, and as the velocity is decreased the butterfly valve is opened.



Cross Section of a Pierce Governor, Showing the Mechanism Actuated by the Movement of the Weights by Centrifugal Force.

The governor is lubricated through an oil cup in the housing. Being dust and water tight there is little probability of wear.

The action is positive and simple and adjustment is easily made. The governor can be sealed so that the owner may know if attempt is made to change the maximum fixed for vehicle speed.

The H. H. Franklin Manufacturing Co., Syracuse, N. Y., is now producing an order for crankshafts and other materials for the Pierce-Arrow Motor Car Co., and the Wright-Martin Corporation.

Total Production of Truck Industry

Editor Motor Truck:—

Can you advise us the approximate number of trucks manufactured annually by the industry since the use of power trucks has been recognized as practical. This information may have been published, but we do not have it available.

J. E. B.

All statements made refer to calendar years. The first vehicles built commercially for freightage were produced at the works of the Riker Electric Vehicle Co., Newark, N. J., in 1898, and delivered to B. Altman & Co., New York City. The industry may be dated from that year. From 1898 to 1905 numerous trucks were built experimentally, but few for commercial sale.

There was no reason for the manufacturers to make report of production to officials or organizations. Changes in the industry were exceedingly numerous and not generally known. Statements relative to this period are estimates only. What were rated as trucks were in many instances passenger car chassis equipped with freight bodies.

In April, 1917, General Manager Alfred Reeves of the National Automobile Chamber of Commerce presented a brief to the committee on finance of the United States Senate, then considering a war revenue bill, which stated that there were about 300,000 "commercial vehicles" in use in the United States. This estimate, no doubt based on the best information obtainable, and conservative, did not specify what part of this total, if any, represented converted passenger car chassis. This brief also stated that the production in 1916 was 90,576, of which number 18,903 was exported.

The best founded figures showing production are the following:

1905.....	750	1911.....	18,000
1906.....	1,000	1912.....	25,000
1907.....	1,500	1913.....	28,000
1908.....	3,000	1914.....	35,000
1909.....	5,000	1915.....	74,000
1910.....	9,500	1916.....	90,576

This gives a total of 291,326 for the 12 years, but includes the machines exported in 1914, 1915 and 1916. This does not allow for wastage from various causes, and as Mr. Reeves' figures were as of April, 1917, and included the exportations, there is reason to believe that his estimate of "commercial vehicles" also comprehended the converted car chassis. The ratio of shrinkage of trucks, especially those built prior to 1911, was large, but as the total production for that period was less than 25,000, the actual loss in numbers and the exports was probably compensated by converted car chassis.

The estimated total production for 1917 is approximately 190,000, but this included the exportations and the United States purchase for army service. This total, however, seems to be excessive. One estimate of the 1918 production, including government orders and exports, is 310,000, which also appears to be considerably in excess of what known facts justify.

But accepting the estimates as stated, this would give a total of about 481,000 as the production up to the beginning of the year, from which must be deducted the normal shrinkage and the exportations and the sales to the United States to obtain the number in actual use.

Various conclusions can be made, but obviously anything like definite figures are hardly obtainable.

NATION MUST HAVE HIGHWAY POLICY

Uniform Road Laws, Standard Construction and Careful Maintenance Necessary to Obtain Good Roads

WHATEVER may be the advantages of our democratic form of government we often realize that a nation composed of states that are sovereign and enact their own laws cannot have the privilege of uniform laws, or universal laws, whatever term will best express the application, unless through educational campaign the people of each state, or such majority of states as is required by the constitution, shall sanction them.

There are times when there is keen realization of the value of general law, and seemingly all laws should apply alike. This statement has been brought home by the conditions that obtain with reference to laws obtaining with reference to highways and highway maintenance. Today there are national, state, county, town, city and village laws, and apparently were there one law relating to highways, which would be broad enough to provide for every condition and eventually such legislation would be better observed, there would be a more equitable enforcement, and the results so far as regulation are concerned would be far more satisfactory.

Nominally each state is separate and apart, each governed for the best interests of its citizens. Many laws are intended to protect the people of a state against the acts of the inhabitants of other states, and frequently statutes vary and conflict. Not infrequently laws are enacted for the benefit of a group of men which would not be regarded as equitable or even tolerated by the majority of the people of the nation.

No National Highway Laws.

The nation has Federal statutes, but

these have been enacted when apparently there was need of specific general legislation. Congress left the general subject of highways severely alone, probably from the fact that congressmen believed a national policy could not be established that would satisfy the people, and the cost of construction and maintenance would reach such an enormous sum that it could not be provided save by extremely heavy taxation—so heavy in fact that it would be regarded as prohibitive.

But the conditions have changed mightily since the idea of state individuality and sovereignty was foremost in the minds of political leaders. Industrial and commercial interests are in many instances nation wide. That they are paramount to all other considerations will not be denied. The activities of thousands of enterprises are interstate instead of intrastate, and these have necessitated the establishment of vast systems of transportation, both for production and for distribution and for communication.

Need of Highways Not Realized.

The need of highways was never so greatly emphasized until the railroads were congested from the haulage of supplies and munitions, first for the European nations and later with the constantly increasing transportation demand resultant from the organization of the American army and its transshipment overseas. Then came the demand for the relief of the railroads and the endeavor to stimulate shipping by road vehicle so far as this was practically possible. The government has appropriated \$85,000,000 to be apportioned to

the states annually for a short period of years, conditional upon the states each providing amounts equal to the apportionment, to be expended upon such highways as may be determined.

In the expenditure of this appropriation there is no definite policy. By that is meant that there is no system of highways, such as is necessary for the economic and military needs of the states, comprehended either by the nation or state. The appropriation is seemingly large, but assuming \$160,000,000 as the approximate total, this would build but 10,666 miles of road at \$15,000 a mile, and this is a very small estimate at present cost of material and labor for constructing a highway that would endure heavy traffic, even with systematic and constant maintenance.

Federal Highway Policy Imperative.

What is necessary is a definite Federal highway policy. Such a policy must be coordinated with state and municipal needs so far as this is practical for the development of main traffic arteries between commercial centers, but so planned that they would have equal value for military purposes in the event of the nation being at war. The necessity of having roads so constructed they will endure under heavy and continuous traffic, and adequate for army movement is obvious. Such highways would cost large amounts, and there would be need of providing means of maintenance. But they would undoubtedly be a very wise investment of public funds.

Statements have been made that American highways cannot be compared with the roads of Europe. This may be true from the viewpoints of construction and maintenance, but one must understand that European nations have been building roads for more than a century and the aggregate cost has been very large despite cheap materials and labor. The area of France or Germany, which have the best highways of continental Europe, is approximately 6.66 of the area of America exclusive of Alaska and all colonies or dependencies, and only about 80 per cent. of the area of Texas. The mileage of what may be regarded as road in America is, not including city, town and village streets, approximately 2,500,000.

Nation and States Must Agree.

Without question but a very small part of this enormous total could be even moderately improved annually for taxes that would afford a sufficient amount for practical work on all roads would be prohibitive. The only logical course appears to be the determination of a national policy, which would be so far as possible in accord with those of the states, and the main expenditures can only be made on the necessary or essential highways until the Federal system is completed.

The transportation of freight over roads will increase each year. If highways are constructed for the use of vehicles, and that is the only reason they are built, wear and maintenance must



Half 3½-Ton Truck with All Purpose Body Operated by the Dorchester Bottle Co., Boston, with Load of Crates.

be expected. No reasonable person will expect construction of any kind to endure without repair. This applies equally as well to roads as to any other work. The greater the use the greater the wear and the more the expense of maintenance.

No Conflict with Railroads.

There is no reason to believe that highway freightage will be destructive of the earning powers of railroads. While it is true that many of the commercial centers that are or should be on direct or communicating highways are also reached by railroads, this does not mean that the two forms of transportation are competitive.

The cost of transportation by vehicles on the roads of America probably exceed \$1,000,000,000 a year. With good highways and economic means of haulage to and from railroads, or between points not reached by railroads, this expense could no doubt be reduced 50 per cent. When one considers that this vast amount represents waste, either because of conditions that cannot be controlled without systematic endeavor, or from negligent and unintelligent use of highway vehicles, there is little need of further emphasizing that the nation ought to begin road development that will result in material economies of time and labor.

Food Production Depends on Roads.

There is another extremely important factor that has been seemingly lost sight of by those responsible for national and state policies and expenditures. The demand for food from the world has very greatly exceeded the production of the crops of the United States. For two seasons endeavors have been made to obtain the greatest possible yield. The coming year, with shortage of labor, crops that will equal those of 1917 and 1918 will only be obtained by decidedly far better organization and a greater degree of cooperation.

Students of agricultural economics have pointed out that the consumption of food by the United States for a generation has been gaining on production, so there has been a gradual shrinkage in surplus available for export. This has resulted in increase of prices practically in ratio to the decrease of surplus. The greatest obstacle to crop production, because it so largely adds to cost, is highway haulage. The crop producer cannot sell at prices that will insure a specific profit above production. He can only obtain prices that are, for principal crops, practically standard the country over, and if his production cost is increased substantially from transportation his margin or net earning may be much lessened, or wiped out, or his operations even show a deficit.

If the roads are such that with good vehicle equipment production and delivery to a market will cost so much less than prevailing prices that substantial profit will be gained the agriculturalist will benefit through highway improvement and there will be no additional expense to be paid by the consumer. With highways unimproved the crop production is limited, the farmer has small

profits and the consumer, as always, pays the highest prices. The time and labor that might be saved with good highways is absolutely wasted.

Highway building has been deferred simply because we as a people have, in our ignorance, assumed that by minimizing taxation for road purposes we were economizing, when as a matter of fact decreased transportation cost would lessen considerably all prices, not only of food, but practically everything that may be regarded as necessities. Transportation and distribution cost are usually regarded as equaling the expense of production. If these could be reduced there could be decrease of prices and at least the same margin of profit.

The war has caused us to consider problems never before seriously regarded. There is no one more important than food production, and correlated with this is the necessity of minimized transportation cost, which will only be possible through the improvement of highways wherever these shall be necessary to stimulate agricultural operations and to obtain service between commercial and industrial centers.

Highway building is not a matter for political discussion. While it must be dealt with politically to obtain results, there ought to be universal acceptance of the economies of good roads and the only limitation to appropriations should be the consistent requirements of a national plan of development.

MICHIGAN RURAL EXPRESS ORGANIZATION.

The campaign to establish rural express lines in Michigan, which has been undertaken by the Michigan Highways Transport Committee, of which William E. Metzger of the Detroit Automobile Club is chairman, and the first appointment of the body is J. E. Hanley, manager of the delivery system of the J. L. Hudson Co., Detroit, as chairman of the southeastern Michigan district, which includes Wayne and adjacent counties. Mr. Hanley as chairman will appoint the members of his organization and then the development of the service will be undertaken.

The Dayton, O., plant of the Maxwell Motor Co., Inc., is being converted for the manufacture of war munitions.

SMALL POWER UNITS HAUL BIG LOADS ON TRAILERS.

Where comparatively large loads are to be hauled and the largest degree of economy is essential, the tractor and trailer or semi-trailer is regarded as affording the best results from the fact that the operating expense for a tractor is seldom more than for a truck rated at from 33 to 50 per cent. of the load capacity of the larger unit. The average semi-trailer and tractor will carry practically double the tonnage of a truck of a given rating, and with a trailer the load may be increased to three times what a truck could carry. The truck will have perhaps greater speed and the operating cost may be somewhat smaller, but the time lost in more frequent trips and handling of loads will often exceed in value the additional expense of operation.

Large units are not necessary to haul loads that are comparatively heavy. In fact a small power unit can be adapted to obtain surprising results. The accompanying illustration is an example of tractor possibilities. It shows a model A Republic truck used as a tractor with a model F-25 King trailer, that is rated at $3\frac{1}{4}$ tons capacity, owned by Benjamin Fillmore of Shickshinny, Pa., loaded with 700 feet of mine props, that weighed approximately six tons. The load was three times the rated capacity of the tractor unit, and aside from the additional fuel and gas there was no increase of operating expense.

RUSSEL MADE MEMBER OF WAR CREDITS BOARD.

A. W. Russel, interested in the Russel Motor Axle Co., Detroit, and formerly president of the Russel Wheel and Foundry Co., has been appointed a member of the War Credits Board by Acting Secretary of War Benedict Crowell, to fill a vacancy caused by the resignation of F. P. Neal. Mr. Russel is one of the best known of Detroit's business men and has long been identified with manufacturing enterprises in that city.

A factory may be erected at Independence, Mo., by the Hale Kerosene Carburetor Co., a company organized by E. J. Killen of Omaha, Neb., and J. A. Abbott of Kansas City, Mo.



Republic Two-Ton Truck and King Semi-Trailer Hauling a Load of 700 Feet of Mine Props, Weighing About Six Tons.

UNITED WAR WORK CAMPAIGN

**Seven Welfare Service Agencies Will Make
United Drive for \$170,500,000 November
11-18, to Serve the Boys at Front**



**Knights of Columbus Truck Supply Train
Leaving Paris for the Front Line Distribution Bases.**

BEHIND the American armies that are sweeping so valorously across the battlefields of France, and so close that at times they are in trenches, in dugouts, in shell craters and often under fire, are the welfare workers—the representatives of the different civic bodies that in normal times are institutions, organized and supported by individuals.

Today these organizations represent the American people. All soldiers are entitled to the comforts and conveniences and the supplies that each provides from whatever resources may be available. There is the same spirit of unity that has characterized the American soldiery wherever met. It is a striking evidence of the solidarity of



Salvation Army Brigadier Greeted by Yankee Soldiers Resting While En Route in a Motor Truck.



Two Knights of Columbus Secretaries and the Trucks with Which They Follow the American Soldiers from Camp to Camp, at Home or Abroad.

the people of the United States.

Until now each organization has solicited contributions individually. This has meant a great deal of unnecessary endeavor. At President Wilson's request the Young Men's Christian Association, the Young Women's Christian Association, the Knights of Columbus, the Jewish Welfare Board, the War Camp Community Service, the American Library Association and the Salvation Army have undertaken a single campaign, from Nov. 11-18, to raise \$170,500,000, which shall be devoted to whatever uses may be determined by the committees that distribute the funds.

Were seven different appeals made, and seven different campaigns conducted, these would be less effective than one great drive that will be participated in by all organizations and for a common cause.

United War Work Campaign.

This united appeal will be known as the United War Work Campaign. It will be conducted by a national committee of 35 men and women, consisting of five

representatives from each of the seven organizations. The chairman of the executive committee and the director general is John R. Mott, and the treasurer is Cleveland H. Dodge. This committee was organized within 24 hours after the receipt of the request of President Wilson, and it is now organizing its forces for the cooperative endeavor that will mean so much to the American patriots overseas.

This wonderful welfare work would be impossible were it not for the power vehicles used by the different organizations. There are bases where stores of all kinds are kept, and from which these are distributed constantly. That the reader may comprehend the work that is carried on and the great area that is traversed in this distribution, statement should be made that the seven accredited war service agencies have a combined



Col. Barker of the Salvation Army and One of the Trucks Used to Carry Supplies to the First Line of American Army.

fleet of 1500 automobiles.

Six hundred of these are large trucks and are used to transport the supplies from the points of embarkation to the base warehouses in the intermediate zones, where the goods are sorted and classed for immediate delivery and distribution in the front line trenches.

For distributing 900 smaller machines are used. Each is under the direct charge of a secretary or representative of one of the seven war service organizations, who drives his load of supplies straight into the battle sectors, where it is distributed by the secretary and his assistants among our fighting troops. In this manner hundreds of tons of supplies, such as chocolate, candy, gum, cigarettes, cigars, tobacco and food are daily delivered without any charge whatever among the boys.

Secretaries Work Under Fire.

Unafraid, undaunted, without the slightest hesitancy, these welfare workers enter the lines of actual warfare and carry on their heroic and very necessary work under fire. At times they work 36 hours at a stretch when the fighting is hottest, and when assistance and food are absolutely essential to our tired troops. For a week at a time some of them are on duty from 18 to 20 hours a day without sleep. Occasionally, if not frequently, some of these welfare workers are wounded, some gased and some shell shocked while distributing their supplies, and rendering whatever other service they can for the welfare and comfort of our troops.

Operating in conjunction with the fleet of 1500 cars these seven organizations have 300 automobile camp kitchens. These also enter the battle sectors, and from them our boys are served with hot coffee, tea, chocolate, cocoa, bullion and solid food.

How the Work is Organized.

In all cities where the War Camp Community Service provides a welcome for the man on furlough there is use for motor trucks to carry provisions to the

clubs and canteens. In practically every camp community there are motor buses provided by the War Camp organization and its friends to show the chief points of interest about the city to uniformed visitors. In the cantonments themselves dozens of trucks ply hither and yon supplying soldiers' needs.

In the camps it may be that the truck is marked with the red triangle of the Y. M. C. A., or the sign of the K. of C., or the Jewish Welfare Board, or mayhap the Salvation Army, but in any case it is

carrying supplies to canteens, which mean cheer in the life of the soldier, sailor or marine. In every camp, too, there are passenger cars bearing the blue triangle of the Y. W. C. A., transporting visitors to and from the Hostess House.

Certainly no unit of the motor army receives a more joyous welcome than that of the American Library Association, whether here or overseas, as it arrives at a camp library, a base hospital or a hut, laden with books and periodicals. Such a truck contains fiction and light matter, but best of all from the standpoint of the men are the technical books, which help them to understand the big job of winning war. In every

phase of getting the books to the fighting man motors play a part. There is gathering the books from homes and places of purchase, transporting them to camps or to ships, where they are placed into transport libraries, and overseas there is the transportation to base hospitals, huts and canteens.

In all the soldier welfare work overseas motor trucks are in continual use, the Y. M. C. A. alone having more than 500 trucks and automobiles in use in France at the present time, and driving these trucks is a full sized man's job, as fording of streams, avoiding shell holes and climbing trench parapets are all every day events of the driver's life.

Drivers Must Be Mechanics.

The hundreds of men serving as drivers for the trucks are necessarily trained mechanics. Once started for the front a truck must not be held up, so the man at the wheel must be willing and able to "get out and get under" if necessary and make a speedy repair. However, the welcoming shout sent up at the arrival of the truck with its chocolate bars, its cigarettes and the makings for hot drinks, is reward enough for even a man who has ploughed through shell fire and impossible looking mud holes to get to his destination.

The seven organizations will challenge every boy and girl in the country to assist in this great work. There will be two divisions, the Victory Boys and the Victory Girls. The object of the Victory Boys will be to align a million boys behind a million fighters. Those enrolling in either division must pledge to earn and give an amount individually determined for welfare work among the soldiers and sailors, and this means that no boy or girl can give money he or she has not earned.



A Squad of Soldiers at a Y. M. C. A. Hut in a Shell Crater, Showing How Closely the Welfare Workers Follow the Flag. (C) Official Canadian Photograph.

REPUBLIC TRUCK EARNINGS \$200,000 A MONTH.

Statement is made that application is to be made to list the stock of the Republic Motor Truck Co., Alma, Mich., on the New York Stock Exchange. The company is now credited with having earnings exceeding \$200,000 a month, or at the rate of \$2,500,000 annually. The production has steadily increased since the organization of the company, but of necessity it will now be kept to the maximum permitted by the War Industries Board. President James H. Foster of the Hydraulic Pressed Steel Co., and John C. Jay of George W. Goethals & Co., Inc., engineer, have been elected to the board of directors of the company.

STUDEBAKER WAR CONTRACTS.

The Studebaker Corporation is credited with the prospect of several large government contracts, and when these shall be closed the company will, according to statement, have in hand national work that will aggregate in value more than \$50,000,000. The additional contracts are to be for chassis for service vehicles. The company is said to have contract for shells to the value of more than \$20,000,000, and is one of the largest shell makers of the country.

AIRPLANE SHIPMENTS BY THE TRAIN LOAD.

W. C. Potter, acting director of the Bureau of Aircraft Production, is authority for the statement that the factories building engines and airplanes are now producing them in such quantities that train load shipments are made daily to the Atlantic ports for transshipment overseas.

The McDougal Motor Co., distributor of Denby trucks at Pittsburgh, Pa., has purchased the business of the Pittsburgh Haynes Automobile Co. and taken over its salesroom and service station building at 5746 Baum boulevard.

A quarterly dividend of \$1 a share on common stock, payable Nov. 1, has been declared by the Kelly-Springfield Tire Co.

ARMY TRACTOR SABOTAGE AT MAXWELL PLANT.

What is regarded as sabotage that might be fraught with extreme results, detected by military intelligence officers at the plant of the Maxwell Motor Co., Detroit, is now being investigated by Assistant United States Attorney McClear in that city. Five employees of the plant were accused, and one of them, a welder, is stated to have sworn that his foreman ordered him to fill sand holes in cylinder castings, that would have caused the rejection of the parts if rigidly inspected, with lead. The accusation was denied by the foreman and the others jointly accused.

The cylinders were for engines for tractors to be built for hauling heavy artillery. Were defective cylinders used in construction, the defects being concealed by lead, extreme heat would have possibly fused the lead and caused failure of the engines. Were such failure on a battle field the consequences might have been very serious. An investigation is now progressing that may lead to action by a grand jury.

FINANCES OF UNITED STATES RUBBER CO.

Vice President Leland is authority for the statement that the United States Rubber Co. is in the best condition financially in its history, having cash in banks exceeding its indebtedness. The company expects to float an issue of \$6,000,000 five per cent. notes for refunding a part of the General Rubber Co.'s five per cent. bonds due Dec. 1.

EXTENDING POST ROUTE.

An extension of parcels post service from Pittsburgh, Pa., to Cadiz, O., will be made in a few weeks, which will connect with a line from Pittsburgh to McConnellsburg and through that reach Baltimore, so that through service from Baltimore to Cadiz will be possible. The route will be served by three trucks.

The Westinghouse Electric and Manufacturing Co. has declared quarterly dividends of 1½ per cent. on its preferred and common stock, payable Oct. 15 and 31 to stockholders of record Oct. 4.

WILL BUILD AIRCRAFT IN OLDS MOTOR PLANT.

The entire plant of the Olds Motor Works, Lansing, Mich., the subsidiary company of the General Motors Corporation, producing Oldsmobile cars, is to be turned into an aircraft plant for the duration of the war. New buildings will be built and machine and tool equipment installed, the conversion cost being estimated at about \$1,250,000. The employees will be increased by 2000. The purpose is to build Liberty engines and to do other work necessary for airplane production.

The plant has been given over to war work very largely, the car production being curtailed as necessary to meet the conditions of contract. The company is now producing a large order of kitchen trailers, 2000 of which will be delivered by Nov. 1. The purpose of the company is to manufacture cars after peace has been declared, statement being made by President Van Linden that all of the plant and the machine and tool equipment being what can be utilized without material change.

FORD HAS \$150,000,000 ORDER.

The Ford Motor Co. is credited with making contracts with the English government for "tanks" for army service to the value of \$150,000,000, this being a part of the equipment that is to be constructed for that country. Statement is made and very generally accepted that the United States will also authorize the construction of a very large number of machines of similar size and type.

NEW KISSEL AGENCIES.

Agency representation of the Kissel Motor Car Co., Hartford, Wis., has been made by contract with the Marvel Motor Co., Kline, Col.; Hunsperger & Son, Corvallis, Ore.; Oswalt Garage, Tuscaloosa, Ala.; Wade Motor Co., Calera, Ala.; Wade Motor Co., Centerville, Ala., and Kraci Bros., Rogers, Neb.

CHALMERS STOCK REDUCTION.

The reduction of the capital stock of the Chalmers Motor Corporation from \$7,060,000 to \$6,400,000, has been approved by the stockholders and this will be accomplished by the elimination of 132,000 shares of common stock of no par value held in the treasury.

The creditors of the Regal Motor Car Co., whose claims were secured by first mortgage gold notes, will be paid in full. The unsecured creditors will receive from 20 to 25 per cent. of their claims, according to statement by the Security Trust Co., Detroit, receiver for the company.

The new addition to the plant of the Oakland Motor Car Co., Pontiac, Mich., will be ready for occupancy about Dec. 1. This will afford more office space and increase the emergency hospital ward.



Employees of the Goodyear Tire and Rubber Co., Akron, O., Training in the Rhythms of Military Evolutions in Preparation for War Service.

WHAT TRACTOR SERVICE IS BEST?

By Fred W. Mellis, Advertising Manager, Minneapolis Steel and Machinery Co., Minneapolis, Minn.

The best tractor service is not that which is constantly repairing an owner's tractor for him; it is that which teaches the owner how to operate and care for his own machine so as to lessen the need for repairs, with their consequent expense and idle tractor hours.

WHEN one speaks of "service" to tractor owners, some will claim "there ain't no such animal," and others will tell you they could "get the operator's overalls pressed twice a week" if they wanted. To be sure, both are slightly exaggerated statements, but they indicate to what an extent there is lack of standardization in the legitimate service tractors owners should expect and get. In the first place, it should be clearly understood by all that "service" does not necessarily mean something for nothing—service means prompt attention to any trouble that may arise, and whether this attention is given by the dealer or the manufacturer, it must cost money. Therefore service should be regarded as a commodity to be sold, and not as a benefaction to be given.

In addition to delivering a tractor to an owner, there is a responsibility, shared equally by the manufacturer and the dealer—the manufacturer to see that the tractor is delivered in good order, and the dealer to see that the new owner has an opportunity of gaining a clear understanding of how to operate and care for his tractor.

All new machinery is stiff and at the time of delivery the owner may reasonably look for legitimate help without cost to him. Beyond that the owner must shoulder his own responsibility and be willing to pay for service that is not rendered necessary by any manufacturing defect in the construction or mechanism of his tractor. A farmer is no more entitled to unlimited free service on a tractor than he is entitled to allow a valuable horse to develop shoulder sores and expect the previous owner to pay the veterinary surgeon's bill. The tractor owner should realize that real service is worth paying for.

The Lack of System.

The heart of today's problem is that it lacks system. The hit or miss policy of dodging needed service to the quiet owner, and treating the other fellow according to the "boiler" he raises, is neither good business for the manufacturer nor the owner, and the settling of a standard service—not a limited, but an ample service, mind you—to purchasers of tractors, is one of the big items that vitally affect the future success of the farmer, as well as that of the manufacturer. To the first it means loss of time waiting for adjustments he could perfectly well make himself, and, by the same token, it means wasted energy to the latter.

So it isn't in the least surprising that tractor manufacturers are seeking hard for a solution of this problem of service.

With any reputable concern seriously engaged in the manufacture of tractors, there cannot be any thought of "passing the buck," or dodging responsibility for the care of its product after it is in its natural sphere.

Coming Nearer Solution.

But, quite frankly, the problem is not definitely solved yet, although it is coming nearer a solution every day. For instance, here is one of the troublesome knots in the tangle—who is the logical party to give service? This is a three-cornered proposition, involving the manufacturer, the dealer and the owner, and it sounds reasonable that each should carry his share of the service load.

No substantial manufacturer, of course, will attempt wide distribution without fully equipped service branches. These exist because they are essential to tractor success, and, of course, the manufacturer wants them to be fully used to the best advantage. But this time saving convenience is abused, rather than used, when a tractor owner calls upon it for some trifling service he could just as well attend to himself. The same man would probably claim fire protection for a straw pile while his neighbor's home was burning. The logical work of the service branches is to take care of serious trouble at critical times, and they will be able to do so better if the dealer and the owner work together. Of course in time of real need the service branch should be called upon without hesitation.

Business Based on Good Will.

Dealers may resent being included in the triangle, but the dealer's business is built upon good will and good will was never created without service. Accordingly, the dealer ought to grasp the opportunity (many of the progressive dealers already have done so) of strengthening his "stand in" with the farming community upon whom he depends for business. By such an arrangement the dealer would gain much and lose nothing. If the cause of the trouble lies with the tractor the dealer ought to be willing to give his service without charge for several reasons.

First. The commission he receives from the manufacturer for his part in selling the tractor is purposely made substantial enough to anticipate payment for a certain amount of gratis service, which the purchaser is liable to require immediately following delivery of the machine, and which should be regarded as completing the sale. The right kind of a dealer knows that a sale is not complete until the customer is satisfied, and that is the only kind of sale he wants to make. Then again the knowledge that the dealer has the ability and inclination to help out is enough to swing the balance in his favor when others are considering the purchase of tractors. Of course, when the cause of the trouble lies with the owner, that gentleman will naturally be willing to pay the dealer

for his time spent on the adjustment just as readily as he would meet a bill for repairs to the heating plant of his home.

Self Service Is Economy.

And so the tractor owner comes into the discussion as a service agent. Now the fact that a man purchases a tractor indicates that he is progressive, and men of that type will quickly realize that self service puts money in their own pockets. First of all he will be prudent enough on running into trouble to look for the cause before risking payment of a fee to the dealer. That is common sense and good business. Secondly, it will occur to him that his own ability to make adjustments cuts down the idle hours of his tractor by saving the time that must elapse before a repair man gets on the ground. This saving of time means real money.

More than that, the owner will be surprised at the knowledge that he gains of his own machine, and how this knowledge enables him to get more and better work at a lower cost out of his tractor. In short, he cashes in on his tractor investment by increasing his output and lessening his cost of operation. Of course behind this profitable self service he knows that emergencies will be taken care of by his dealer, or by the manufacturer's service branch, and so there are three agents working for greater satisfaction to all concerned. It simply puts service on a cooperative basis.

The Need of Education.

A service plan of this description calls for cautious evolution and much educational effort. While the Minneapolis Steel and Machinery Co., as manufacturers of Twin City tractors, believe from experience that service standardization will be more a matter of evolution than of arbitrary action, it has always worked along the lines that education is an all important factor.

That is the thought behind the Twin City tractor school, which is conducted at the big plant each winter. No expense has been spared on the equipment and instruction staff, and it is considered good policy to give these hundreds of students the best facilities the shop can offer. In this way the five weeks' term is made as profitable as possible to the students, many of whom travel from distant states to get this expert knowledge. The school is not a profit earning proposition, but the company regards this educational institution as an investment that will return its own dividends in the form of better results and improved service in the field.

In the meantime the Minneapolis Steel Machinery Co. is backing up its educational work—which is, after all, the best possible service—with fully equipped stations, carrying repairs, so as to provide against the needs of Twin City owners in the shortest possible time. The factory, of course, is back of the entire organization with a special department to meet service calls.

Truck Excise Tax Cut 50% by Senate Committee

Announcement has been made to the members of the National Automobile Chamber of Commerce that the finance committee of the United States Senate, now considering the war revenue tax bill, after it had reduced the proposed tax on automobile vehicles, parts and accessories from 10 per cent. to five per cent., believing that the tax as proposed made a greater burden upon the industry than was fair when comparison was made with other industries, has also made a substantial reduction in the proposed excise tax on passenger cars and trucks.

This in effect is a reduction of 50 per cent. in the proposals in the bill prepared by the ways and means committee of the House, and as seemingly approved the excise tax will be as follows, the fee to be for Federal license to be paid by the owner of the vehicle.

For passenger cars and power trucks:

Up to 23 horsepower.....	\$5
23 and not exceeding 30 horsepower..	10
30 and not exceeding 40 horsepower..	20
More than 40 horsepower.....	25
Motorcycles	5
Electric vehicles, per horsepower....	2
(Instead of \$5) plus 25 cents for each 100 pounds of weight (Instead of 50 cents) as in the House bill.	
Taxicabs, seating two to seven persons 10	
Motor conveyances in public service, carrying more than seven persons..	20

BECKER ENTERS SERVICE.

C. H. Becker, formerly with Dodge Bros., later assistant sales manager for the Chalmers Motor Co., and recently district supervisor for the Chalmers-Maxwell branch at New York City, has resigned and will enter the Motor Transport Corps training camp for officers at Jacksonville, Fla.

The Imperial Sales Co., Toronto, Ont., agent for Acason trucks, of which S. M. Wilder is general manager, has developed a very strong distributing organization in that territory.



Part of the Fleet of Mack 7½-Ton Trucks Operated by the Wilkes-Barre and New York Carrier Corporation, Serving All Principal Places Between Terminals in Pennsylvania and New Jersey.

"MODERN MOTOR CAR."

"The Modern Motor Car," which is specified to be a book of simplified upkeep, written by Harold P. Manly, has been issued in revised and enlarged form by Laird & Lee, Inc., Chicago. While the title would imply that it deals with passenger cars the book as a whole can be applied to truck design, construction, adjustment and repair, and to both shop work and adjustment or temporary restoration on the road. In addition the author has included some excellent advice relative to how to buy, make and use materials and supplies.

The book is in five sections, the first of which is devoted to motor car parts, their construction, use, care and repair; the second to how to use, buy or make materials and supplies used in operating a vehicle; the third to an explanation of the principles of electricity; the fourth to electric lighting and starting, and the fifth to ignition, covering the design, construction, use, care and repair of various units. It is valuable to owners, drivers, repairers, salesmen and students alike. The book contains 536 pages and it has 225 illustrations. Briefly stated, three-fourths of the book is given over to repair methods and practice, troubles and their remedies, adjustment, care, fitting, removal, replacement, disassembling and assembling.

STUDEBAKER GETS BIG WAR TRACTOR CONTRACT.

Statement is made that the Studebaker Corporation, South Bend, Ind., has received an order from the English government for 5000 chassis, which will, it is believed, be used for the construction of a small battle tank. The production of this order will necessitate the installation of additional facilities and considerable additions to the Studebaker plant.

NEW BESSEMER TRUCK PRICES.

The following are the latest quoted for the units produced by the Bessemer Motor Truck Co., Grove City, Pa., all of which are the internal gear drive type:

Model G, one ton (with body).....	\$1495
Model H, 1½ ton, chassis.....	1945
Model J, two ton, chassis.....	2490
Model K, 3½ ton, chassis.....	3450

GENERAL MOTORS MAY ABSORB UNITED MOTORS.

The stockholders of the United Motors Corporation, which includes the Hyatt Roller Bearing Co., Remy Electric Co., New Departure Manufacturing Co., Dayton Engineering Laboratories Co., Perlman Rlm Corporation, Harrison Radiator Co., Klaxon Co., and the United Motors Service, Inc., will meet Oct. 30 to consider a plan for the absorption of the company by the General Motors Corporation.

Statement is made that the United Motors is to be taken over at practically the assessed stock valuation, and that the stockholders will receive three shares of General Motors preferred and one share of common stock for 10 shares of United. Fractional shares are to be paid for on the basis of \$80 a share for General Motors preferred and \$125 for General Motors common stock. Estimate is made that this exchange is equivalent to payment of \$36.50 for each share of United. The United stock sold for \$32.12 the day prior to the announcement of the probable absorption.

There will be transferred, if the action of the stockholders is favorable, 330,492 shares of preferred and 110,164 shares of General Motors common, which would establish the price paid for the United Motors \$40,209,860. The total capital stock of United Motors as last reported was \$40,234,800.

The General Motors Corporation now includes the Weston-Mott Co., Northway Motor and Manufacturing Co., Champaign Ignition Co., Jackson-Church-Wilcox, and other concerns aside from its passenger car, truck, tractor and farm implement companies. The capital of the company is now \$350,000,000.

CHALFONT ENTERS EXPORT FIELD.

E. P. Chalfant has resigned as eastern division manager of the Anderson Electric Car Co., to become general manager for the Automotive Products Co., a concern formed a year ago by the American Steel Export Co., which is to specialize direct foreign representation of American manufacturers of automotive products of every description. Mr. Chalfant was for a considerable period associated with the Metz interests at Waltham, Mass., and later was general manager for the Association of Licensed Automobile Manufacturers, and was associated with the Thomas and Packard companies and with the Chalmers Sales Corporation.

MOTOR TRUCK CLUB BECOMES ASSOCIATION.

The Motor Truck Club of America has changed its name to incorporate the word association instead of club as a means of making its title more significant of the purposes of the organization. It was found that there had been considerable misunderstanding as to the organization's objects, and its methods of attaining them, due to the fact that the title of "club" conveyed an erroneous impression.

BUILD TRUCK ENGINES FROM REJECTED PARTS.

War needs compel what would seemingly be strange economy in normal industrial conditions. What would ordinarily be regarded as waste is now made use of to good advantage. An illustration of possibilities is a contract recently credited to the Wilson Foundry and Machine Co., Pontiac, Mich., which has undertaken to build engines suited for truck construction from parts originally made for Liberty engines, but which were not accepted as standard by the inspectors.

The company is to take these parts and by adapting them by practical methods make them entirely satisfactory for vehicle construction, although they were because of some defect of workmanship unsuited for Liberty engine building.

OVERLAND GETS BIG BRITISH CHASSIS CONTRACT.

Statement is made that the Willys-Overland Co. has made contract with the British government for 10,000 vehicle chassis, but there is no knowledge whether this requires passenger car or delivery wagon construction. The production facilities of the Overland plant at Cleveland are believed to be the second largest in the industry, and yet an order of this proportion would be a considerable undertaking in addition to the enormous output necessary to meet existing contracts. Willys-Overland Co. is credited with having on hand orders for war work valued at approximately \$75,000,000.

BOYDSON JOINS SERVICE CO.

L. H. Boydson, formerly director of sales for the Sandow Motor Truck Co., Chicago, has joined the Service Motor Truck Co., Wabash, Ind., as district sales manager and will have supervision of Service agencies in the states of Wisconsin, Minnesota, Iowa, North and South Dakota and Nebraska, succeeding Frank A. Drage. Mr. Boydson is widely known in the industry and trade, especially in the Middle and Northwestern states.

ACASON REPEAT ORDERS.

Repeat orders for truck received by the Acason Motor Truck Co., from the Hog Island ship yard, is regarded as very substantial approval of the satisfaction obtaining from the trucks. Statement is made that a very large number of machines have been thoroughly tested in the service of the yard, and additional purchasing has added weight because of this reason.

William B. Stout, who was technical advisor to the Aircraft Production Board, aircraft engineer for the Packard Motor Car Co. and vice president in charge of engineers for the Scripps-Booth Corporation, is about to engage in air plane manufacture in Detroit.

Tire Filler Industry Is Fully Organized

The American Tire Filler Industry (Inc.) was organized as the result of a convention of representatives of the principal concerns in this country manufacturing tire filling held at the Congress Hotel, Chicago, Sept. 15-18. There are about 25 different concerns in this country producing fluid, semi-fluid or solid material for filling tubes intended for pneumatic tires, the purpose of the fluid or semi-fluid compounds being to fill punctures of tubes by exudation and retain the filling, and of the solid fillers to afford a sufficient degree of resiliency and yet be free from the delays, inconvenience and expense of tire deflation and inflation, changes and repairs.

The manufacturers of these fillers maintain that while the same ratio of resiliency obtainable with air filled tires is not realized with the use of tire filling, there is sufficient shock absorption to insure the comfort of passengers and protection of freights and to much reduce the mechanical wear from vibration. They maintain further that the insurance against tire destruction from puncture, delays, labor of changes and the reduction of repair cost compensates for any lessened comfort while riding. Statement is made that tire filling will insure a uniform degree of inflation and even wear of tires, that there is little probability of rim damage and the number of tubes required is much less than when air is the inflator. There is less need of carrying spare casings and tubes, changes are not necessary until shoes are completely worn, and many of the accessories used with tires, such as valves, pumps, gauges, patching sleeves, jacks, etc., are not necessary for either passenger cars or trucks equipped with filled tires.

The convention held open sessions at which were present representatives of the War Department, the American Red Cross, Y. M. C. A., Salvation Army and numerous economy, labor and defense boards. The convention was opened by Franc D. Mayer of the Essenkay Products Co., Chicago, who stated among other things that very large savings could be accomplished by inflating automobile vehicle tires with resilient filler instead of air. He held that the use of filler doubled the life of tires, which meant a saving of 50 per cent. of the cost. Basing estimate on 4,000,000 passenger cars in use in the United States and assuming eight tires a year for each, 22,000,000 tires were needed annually, and at an average cost of \$20 a tire this meant \$640,000,000 spent yearly for tires for passenger cars, excluding the expense of spare tires, rims, tubes, jacks, pumps, etc. A saving of 50 per cent. would mean \$320,000,000.

He further estimated that \$260,000,000 is spent for accessories for tires, of which \$193,000,000 was for tubes alone. Adding the savings of \$320,000,000 and \$260,000,000 made a total of \$580,000,000, which he believed could be saved in very

large part by the use of tire filler instead of air, basing this on 4,000,000 cars, and as a matter of fact the total number of vehicles of all kinds using pneumatic tires considerably exceeds 5,000,000.

One phase dealt with by numerous speakers, some of whom had served on the battlefields in France, was the possibility of equipping ambulances with filled tires to obviate the delays from differing damage that necessitated changes, or driving on deflated casings that was destructive of shoes, tubes and rims, increased the suffering of wounded or sick, and decidedly retarded movement of vehicles that were frequently needed in far greater numbers than could be supplied.

The conclusions of the convention may be summarized as follows with reference to the use of tire fillers:

(a) Such use reduces the likelihood of ambulances, trucks or officers' cars in the United States army service being delayed under fire or at other critical time.

(b) Such use would prevent delay of munition shipment by trucks.

(c) Such use would facilitate food production and transportation.

(d) Such use would release labor now directed to needless production, obviate waste of labor, costing in the aggregate a large amount of money, and minimize the labor necessary for repairing.

(e) Such use would greatly lessen the demand for rubber for tires and would release rubber now used for other essential requirements.

The convention believed that the government needed tire filler in every branch of its transport service, both in this country and abroad. The convention approved a resolution offering to the government the plants, products and experience of the members of the American Tire Filler Industry, Inc., in conserving life and materials now lost from tire damage or destruction.

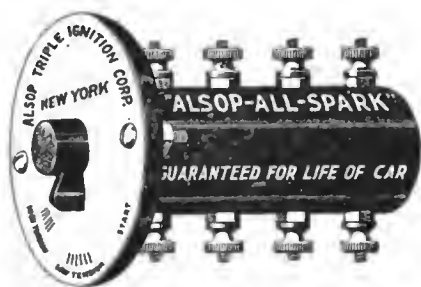
The convention elected the following officers for the coming year: President, Franc D. Mayer, Essenkay Products Co., Chicago; first vice president, Frank A. Hager, Universal Tire Filler Co., Portland, Ore.; second vice president, Lee W. Lockwood, Dahl Punctureless Filler and Rim Co., Minneapolis, Minn.; third vice president, W. W. Major, National Rubber Filler Co., Midlothian, Tex.; secretary, C. P. Umstot, Peerless Tire Filler Co., Chicago; treasurer, L. G. Harris, Wolverine Tire Cushion and Accessory Co., Detroit; directors, the officers and J. Wolff, National Synthetic Tire and Rubber Co., New York, N. Y., and C. G. Schwarz, Panama Rubber and Equipment Co., St. Louis, Mo.

BALL BEARINGS AND STEEL BALLS ARE ESSENTIAL.

The Priorities Division of the War Industries Board has placed manufacturers of ball bearings and steel balls on the preference list with a rating of Class B-3, conditioned upon their executing and filing pledges of cooperation with and observance of the rules of the Priorities Division.

Equipment, Tools and Supplies for the Truck, Garage or Service Station.

The "Alsop-All-Spark" is claimed by the makers to make possible the use of old dead carbon choked spark plugs with as good results as can be gotten from new ones without this device. It goes much further than the saving of spark plugs, as the reinforced spark is a more positive exploder of the gasoline. When it is considered that there are more than 5400 sparks per minute in a six-cylinder engine, which runs 3600 revolutions per minute and only a certain per cent. explode the gas, it can be readily seen that a device which gives such a powerful spark will penetrate through heavy oil and spark dead carbonized plugs, will certainly cause a great deal more explosions per spark delivered.



"Alsop-All-Spark."

With this device it is seldom ever necessary to change spark plugs, as a slight turn of dial on the dash will raise the voltage to such an extent that it will overcome any misfires, no matter in what condition the plug may become.

The device screws upon the dashboard and is controlled by a dial inside the car. It is connected between the spark plugs and distributor and will not interfere with any present equipment. The makers claim it to work equally well upon any ignition system. Easily attached in a few minutes.

Manufactured by the Alsop Triple Ignition Corporation, 1765 Broadway, New York City, N. Y. Price for all four cylinder cars, trucks and tractors, \$6.

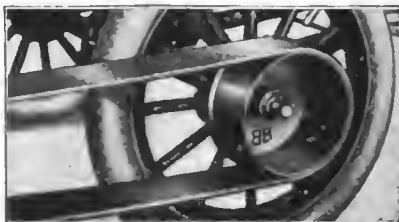
The Yankee Vise, No. 1993, is designed for various uses. It consists of a cast iron body fitted with a sliding jaw, also of cast iron, which is carried back and



forth by a 1/2-inch steel screw. Both jaws are fitted with steel faces and the sliding jaw extends through a slot one inch wide in the body of the vise. The device is mounted upon a swivel base and may be removed for use on a drill press, a shaper or with other machine tools. It may be used for various kinds of work on the automobile. The space between the jaws when fully open is 3 1/4 inches. Fair deliveries.

Manufactured by North Bros. Manufacturing Co., Philadelphia, Pa. Price, \$7.75.

The Bayne "B B" Auto Power Pulley is an ordinary five-inch crown face belt pulley 10 inches in diameter, correctly designed, so that it can be attached to either rear wheel of an automobile by simply



unscrewing and replacing the hub cap, and when so attached is a perfect belt power pulley for transmitting power to any belt driven machinery.

Manufactured by the Bayne Manufacturing Co., Bushnell, Ill. Price, \$5.65.

The Atkins Hack Saw Blades have teeth which are milled and set so that they present the square point to the material which is being cut, instead of a corner, as in many other blades. This feature greatly increases the cutting capacity, for with an equal blade travel the blade has



Atkins Hack Saw Blades.

fully 25 to 50 per cent. more cutting surface than the blades where the corner only is used. These blades are made of an exceptionally fine grade of alloy steel which responds to scientific heat treatment in a perfect manner. Made in all sizes.

Manufactured by E. C. Atkins & Co., Inc.

Perfection Double-Tang Sockets meet the demands of the time for conservation of steel, products and labor, as through their use any taper shank tool with a broken tang can be quickly and permanently reclaimed. When the tang of a tool breaks the workman steps to a grindstone and within several minutes has ground a new one, which is 25 to 60 per cent. stronger than the original. This tang is slipped into the socket and as any of the "P. D. T." sockets will nest into a



similar socket of the next larger size, any desired length of tang can be obtained. These sockets will also hold taper shank tools so that the tang will not twist off; can't get out of order, as there are no loose parts; fit any spindle with a regular taper hole.

Manufactured by the Cleveland Twist Drill Co., 9 N. Jefferson St. Chicago, Ill. Write for prices and literature.

The Meckel Lubricator is a novel device, which lubricates springs, shackles and spindle bolts with oil instead of grease. The great difficulty in oil lubrication has been the control of the fluid and has been surmounted in this device

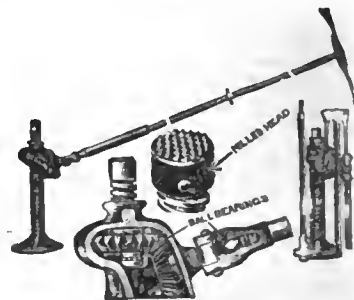
by the use of a valve actuated by vibration, which permits the oil to flow only when the car is in motion. Stopping the



car stops the flow of oil. The manufacturers claim the elimination of squeaks and rattles, freedom from attention except for refilling the reservoirs every 2500 miles. The attachment is simple. It fits into any of the bushings of the bolts and can be applied to a car by any one. It is made in three styles, each adapted to a special duty.

Manufactured by the Meckel Lubricator Co., 1507 Grace Ave., Lakewood, O. Write for prices and literature.

The Kimball Ball Bearing Heavy Type Jack eliminates dirty, hard jack work. Its long handle turns and raises or lowers the heaviest car with ease. Its rigid handle that is swung from the top, not the bottom, prevents it from falling over while being placed beneath the car and all the raising or lowering is done at the end of the long handle. The milled

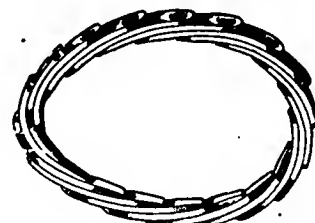


Kimball Jack

head of hardened steel on the top will hold anywhere, on any bolt, spring or clip. The ball bearings carry the lift and thrust, reducing the friction and making the jack work easily. There is nothing to get out of order and the entire jack folds up into a small bag.

Distributed by Edward A. Cassidy Co., Inc., Madison Ave., at 40th St., New York City, N. Y.

Flexo Laminated V Type Belts are made in sections cut from solid back belting hides, assembled with steel copper plated rivets and fastened with machine screws and nuts so that they may be readily lengthened or shortened and adjusted. These belts may be obtained in widths



from 1/2 to 1 1/2 inches, and lengths as desired, endless or in rolls of 50 and 100 feet on spools, with sufficient rivets and burrs or bolts and nuts for making them endless.

Manufactured by Detroit Leather Works, Detroit, Mich. Prices according to widths.

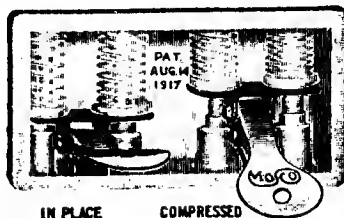
The Dyer Bearing Reamer greatly facilitates the work of fitting main and connecting rod bearings of a Ford engine. The tool leaves a smooth, glassy finish to the bearing surface. The reamer has leads of .004 of an inch at the end of each fluke and is held in line by two adjustable



bearings, which are bolted to the crank case while it is being used. It can be seen from the illustration that by the employment of this tool the lining up of all the bearings is fully assured. Deliveries in one week up to 12 reamers.

Manufactured by the G. H. Dyer Co., Cambridge, Mass.

The Mosco Valve Spring Compressor for Fords eliminates what is usually a troublesome operation, viz., the compressing and removing of valve springs. By using this simple device springs can remain in position until the grinding of the valve is completed. The compressor is placed in position as shown in the left of cut, pushing it back against the cylinder wall, making sure that the tongue which hangs down is over the edge and resting in the channel, then the handle is pushed down as far as it will go. This opera-



tion compresses two valve springs at one time and permits removal of the pins. If the pins are crooked the valve is turned until they are in the proper position to pass through the elots in compressor. After the valves are ground the operation is reversed. The compressor is made of heavy pressed steel. Immediate deliveries from stock.

Manufactured by the Motor Specialties Co., Waltham, Mass. Price, 50c.

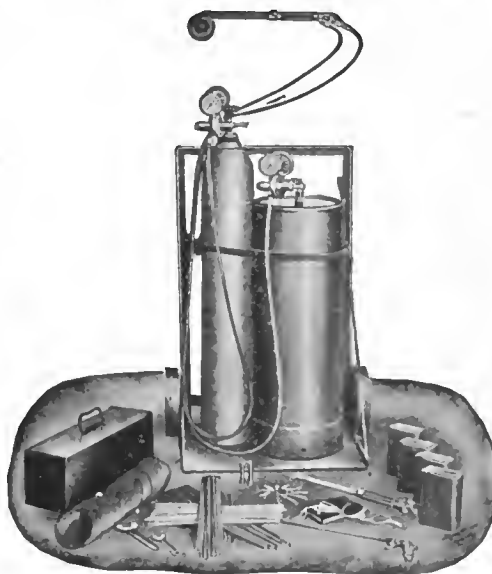
The Socket Wrench Set No. 489, here-with illustrated, consists of a ratchet socket wrench with a 3/4-inch hexagon socket (which may be obtained separately) and four extra sockets fitting it. These extra sockets have 1/2, 11/16, 13/16 and 7/8-inch hexagon openings. The ratchet socket wrench has a seven-inch black enameled iron handle and a very strong ratchet that can be used for either right or left hand work. The lignumvitae head runs on ball bearings. Each set is



packed in a strong and attractive hard wood box.

Manufactured by Goodell-Pratt Co., Greenfield, Mass. Price of set, \$5. Price of socket wrench No 419 with 3/4-inch hexagon socket, \$2.50.

The Dyer Welding, Cutting and Carbon Removing Outfit has two utilities included, that of welding and cutting by the oxy-acetylene process and of removing carbon from the combustion chambers and cylinders of engine. With this apparatus the garage man and repair man can quickly and satisfactorily do all kinds of brazing, welding of broken parts, frame straightening and many other things requiring the use of a welding outfit. The material used in this outfit is of the highest grade. The regulators are strongly built and accurate. The Dyer Co. uses the United States Gauge Co.'s gauges, and the hose used is of extra heavy five-ply fabric. The outfit includes a truck made of the best grade of boiler plate strongly welded. The torches are



simple in construction and easily handled, being of light design and highly efficient. The welding torches cannot back-fire under any circumstances and can be operated to a low enough acetylene pressure to practically empty the gas cylinders. Prompt deliveries on any of the apparatus or complete outfits.

Manufactured by the G. H. Dyer Co., Cambridge, Mass.

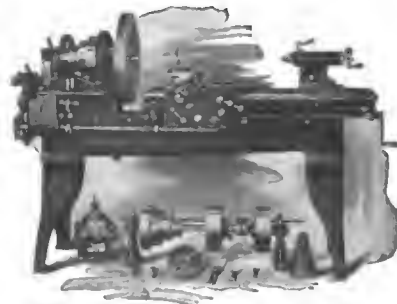
The Beardsley Double Acting Valve Lifter is a time saver, for it removes and replaces Ford valves in less than a minute and in other cars in half the time of other valve lifters. The foot of the device is simply shoved under the spring washer and the cam lever pushed down, which action holds the valve down and



lifts the spring up, giving more room to remove and replace the valves quickly. Sold under guarantee to give satisfaction. Prompt delivery.

Manufactured by the Loomis-Beardsley Co., 71 East State St., Columbus, O. Patented. Price \$1.50.

The Sliding Extension Gap-Lathe is capable of handling a wide range of work. It is provided with six quickly changed gear feeds and an extra large spindle. All the gears are covered with safety guards. The bed of the lathe is well



braced and accurately proportioned throughout. The top sliding bed and main bed are planed full length and fitted together with dove-tail construction. A screw and crank at one end draws the bed back when it is desired to widen the gap between the centers. Fair deliveries.

Manufactured by the Barnes Drill Co., 814-30 Chestnut St., Rockford, Ill. Prices, 5 1/2 foot lathe, \$650; 7 1/2 foot, \$700 f. o. b.

The "Baseline" "Autowline" is a quarter inch yellow strand power steel wire rope with patented snaffle hooke on each end especially constructed for towing disabled cars. It is manufactured of the highest grade steel, quarter inch rope, about 20 feet long, over all. This "over all" length includes two half-inch manila rope elings, which are joined to each end. It weighs 4 1/2 pounds, coils up flat and can be tucked away under a seat cushion. This line can pull a 4000-pound car up a 20 per cent. grade.

Manufactured by the Broderick & Bascom Rope Co., St. Louis, Mo.



"Baseline Autowline."

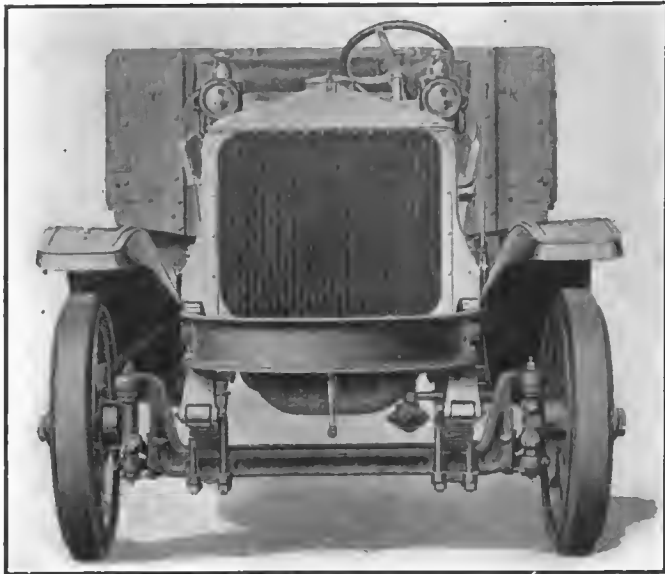
Permatex Heat Resisting Gasket Cement is an extra heavy preparation compounded for use on cylinder heads, carburetors, manifolds, crank cases, gear cases, spark plugs and pump gaskets. It has no harmful action on cardboard, paper, leather, rubber or asbestos or metal, and it is impervious to gasoline, kerosene, oil and water. It is applied in a thin coat to both sides of the gasket just before the gasket is put into place. Prompt deliveries are assured for the next 12 months.

Prepared by Constant A. Bennett, Brooklyn, N. Y.

New Literature on Gasoline Hose. The bureau of standards, Department of Commerce, U. S. government, in a recent report comments on the leaks in valves and piping used for conveying gasoline. Of special interest in this connection is the illustrated literature just issued, for free distribution, by Metal Hose and Tubing Co., Brooklyn, N. Y.

NEW DRIVE FOR HEAVY WHITE TRUCKS

Abandons Chain for Double Reduction Gear for 3½ and Five Ton Sizes—Engines Re- fined and Chassis Perfected



Front of the White Heavy Duty Truck. Showing the Finned Vertical Tube Radiator with Cast Tank, the Frame End Bumper and Straight Axle.

RADICAL change in the system of power transmission that has been the vogue in its heavy duty trucks since its entrance into the industry, and a series of perfections that are carried through the principal construction units, direct attention to new three and five-ton truck chassis developed by the White Co., Cleveland, O. The White Co. is one of the best known truck builders of America. It has until now favored double side chains for driving the rear wheels of its heaviest machines, and bevel gear shaft drive for its lighter types.

It is one of the few concerns that con-

tinued chain drive, and more than three years ago it stated publicly that its engineers had not been convinced that any other form of power transmission was superior; that it would continue to use this until a better form of drive had been developed, and that its decision had been reached after a series of tests had established very clearly the efficiency of the chain in all conditions of service.

The new method of drive adopted is referred to as a double reduction gear, and in effect this means the use of a

single piece rear axle housing with a bowled central section that has an opening on the forward side. This is closed by a cover plate that carries the pinion shaft and the differential gearset as a unit assembly, so that with the removal of this cover or plate and the driving shafts the unit can be withdrawn. The driving shafts extend through the axle housing and are carried in bearings at the outer ends.

Axle a Full Floating Type.

The ends of the shafts carry spur pinions. The wheels are mounted on the outer ends of the axle housing, this being a full-floating construction. On the

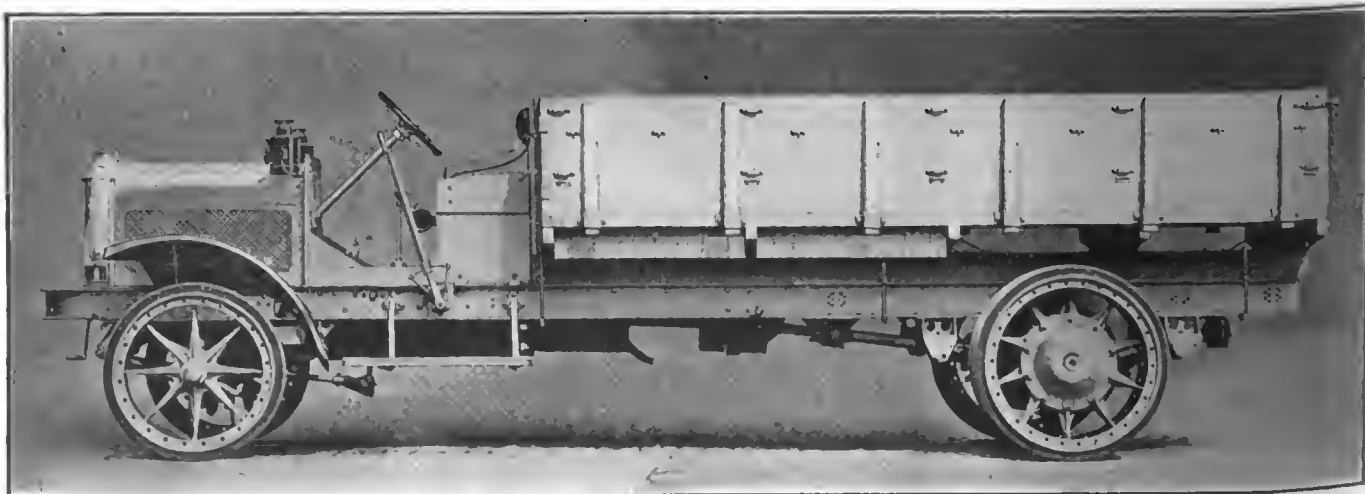
axle housings, inside the bearings for the wheels, are circular flanges. On these are mounted on stub shafts second spur gears that engage with the gears of the driving shafts. The wheels are cast metal and large drums surround the hubs, in which are internal ring gears with which the second spur gears mesh. The drive may be said to be by spur pinions and internal gears through idler gears. Surrounding, or concentric with the internal gears are the drums in which shoes of the emergency brake expand.

The name double reduction gear probably defines the design quite as well as any term that could be applied, but the reduction is obtained through the use of the two spur pinions in a train with the internal gear in the housing of the wheel drum. As may be assumed the axle and gear housings are dust tight and the gears of the differential gearset and the double reduction gearset are constantly lubricated, so that there should be comparatively no wear.

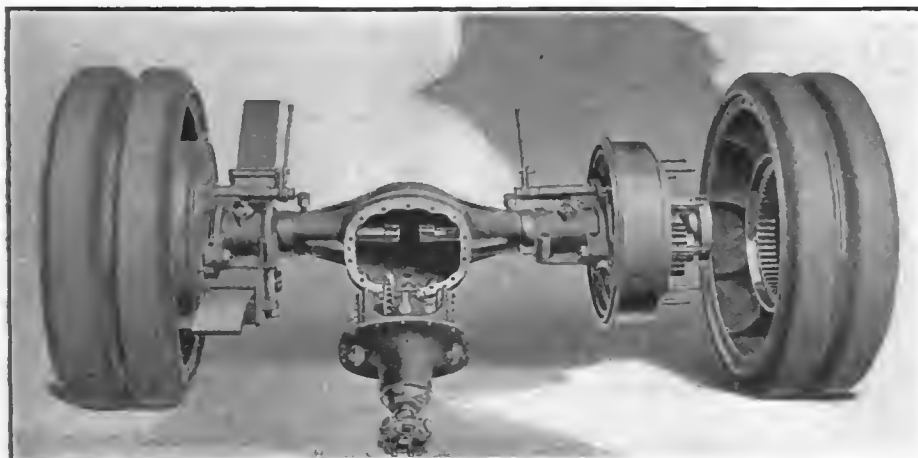
Company's Claim for the Design.

Concerning the new form of power transmission the company makes the following statement: "The chain and sprocket afforded in a heavy duty truck a double reduction system—one reduction in a jackshaft and a second reduction in the chain and sprocket wheels—thus giving a large range of gear ratios and, consequently, a greater flexibility than can be had in any single reduction shaft drive unless the gear housing is made very large and the rear axle, in consequence, heavy and unwieldy. Chain drive also has this advantage: power is applied to the rear wheels on a sprocket attached to them; power is thus applied nearer to the wheel rim and by a rolling contact between the chain and sprocket.

"The new double reduction gear drive accomplishes the same result. There is a first reduction through the bevel gear and drive pinion in the center of the rear axle, from which the power is carried by a live axle of the floating type through the center of the housing to a



Side View of White Heavy Duty Chassis with Army Service Body—The Form of the Frame, the Spring Suspension and the Metal Wheels, the Rear Set Showing the Cases Containing the Double Reduction Gearset of the New Drive.



White Rear Axle: Cover Plate Carrying the Driving Shaft and Differential Gear-set Withdrawn from Housing, and Wheel Removed to Show Train of Gears and Internal Gear.

gear at the wheel end of the live axle. This gear, in turn, meshes with a second gear (carried on the housing of the live axle, but inside the hub case of the rear wheel), and this second gear, in turn, meshes with a ring gear attached to the wheel inside of the hub case.

Three Gears Give Two Reductions.

"In this way of applying power to the wheel a second reduction occurs between these three gears in the hub case very similar to the reduction which takes place between the sprocket wheels of a chain drive. The power is applied at about the same distance from the rim as it is in the case of the chain drive, thereby retaining that advantage. This use of gears makes a rolling contact throughout, without any elements to produce friction.

"The adoption of the floating type of rear axle and the train of gears in the hub case of the wheel enables the whole mechanism to be entirely encased and run in oil. The result is a comparatively frictionless running axle that cannot be cramped or get out of line, and has all of the operating advantages of chain drive with the added advantage in point of maintenance of being enclosed in a dust proof case and running in oil.

"Chain drive had a further advantage over other types of rear axles in the fact

that its unsprung weight was considerably less. The new double reduction rear axle has the same advantage in that the unsprung weight of the truck has not been increased but, in fact, decreased a little. The result will be at once apparent in the life of tires."

Advantages of the Drive.

As in chain drive, the whole design is extremely simple. All parts are readily accessible. The live axles may be withdrawn without disturbing the wheels and the wheels themselves can be readily removed if desired. The bevel drive and differential gears are carried in ball bearings on a detachable axle plate and may be removed as a unit. Gear ratios can be quickly changed if necessary. The moving parts are simple and rugged, and in their dust proof case, running in oil, they are proof against rough usage. The axle housing is so compact that it affords practically the road clearance of a straight axle.

The double reduction principle has been a large factor in the efficiency of White 1½-2-ton trucks, so widely used in both commercial and military service. It has long been an engineering problem to apply this principle to shaft driven, heavy duty trucks and in the new White models it has been accomplished without using a large axle housing, without an

auxiliary axle, without increasing unsprung weight and without sacrificing simplicity.

Power Plant Improvements.

Engine improvements in the new trucks consist of a unit power plant which is a development of the monobloc design always used in White trucks. Apart from the advantages of compactness, fewer parts, reduced weight and better alignment, the company has improved its operation by employing a greater valve capacity, a balanced crank shaft and a pressure feed lubrication system—features which have shown high efficiency in heavy duty service of greater severity.

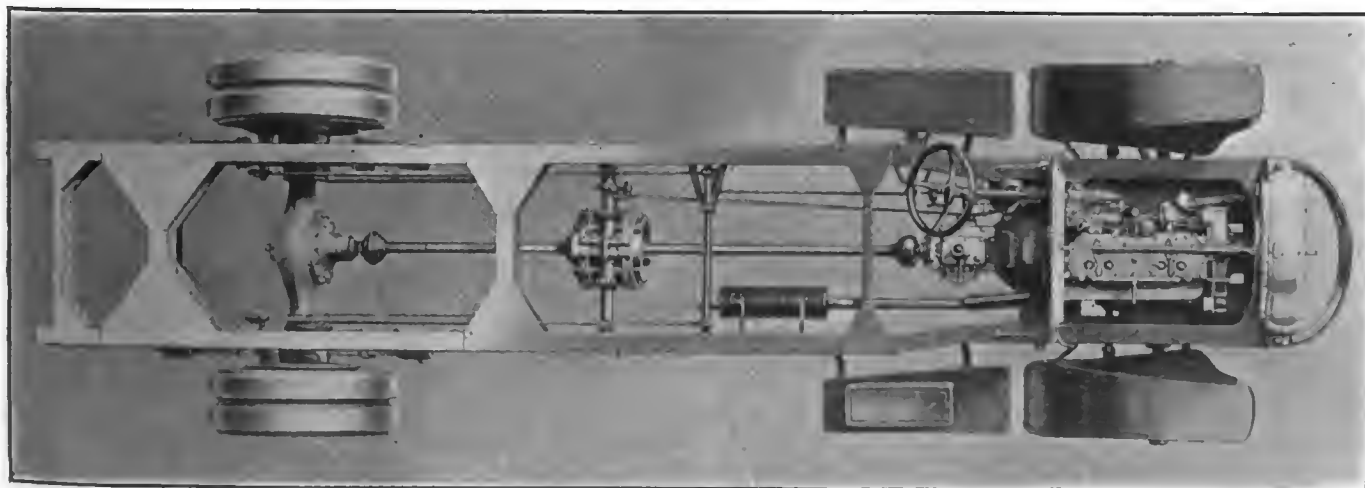
Other advantages have accrued from the careful development of details promoting efficiency. Thus the radiators of the new heavy duty series are strong castings with removable heads, giving access for quick replacement of the vertical tubes if damaged by collision or otherwise rendered leaky. The radiator itself is flexibly mounted on springs to absorb vibration and road shocks.

Improvements in Brake Design.

Through the adoption of the double reduction gear drive the company has been enabled to also improve the design of the brakes. The service brake is of the contracting type, operated by foot pedal and acting on drums on the drive shaft. The brake is mounted amidships, on a cross member of the frame, where it is more accessible and where a larger braking surface can be used, applying a greater braking resistance and insuring a longer life. The emergency brake, operated by hand lever, is of the expanding type, acting on drums on the rear wheels, completely enclosed and designed with a simple external adjustment.

Characteristics of Construction.

Aside from the dimensions of the engines, which have cylinder bore of 3¼ inches and stroke of 5¼ inches for the three-ton chassis, and bore of 4¼ inches and stroke of 5¼ inches, there is comparatively little difference in the specifications stated for the two machines. The engines, clutches and transmission gearsets are combined in unit power plants,



Top View of White Heavy Duty Chassis: The Exceptionally Strong Construction of the Frame, the Unit Power Plant, the Spring Suspended Radiator, the New Rear Axle, the Driving System and the Shaft Brake Amidships Are Clearly Shown.

the engines having removable cylinder heads. The valves are on the right side and are enclosed, the valve mechanism being accessible through removable plates.

The engines are lubricated by pressure feed systems, oil being forced to all main bearings by gear driven pumps and carried to the crankpins by oilways in the crankshafts. The pistons are lubricated by spray from the crankshafts, and the wristpins are supplied by oil tubes in the connecting rods. The engines are cooled by circulations of water through the cylinder jackets and finned vertical tube radiators with cast top and bottom tanks, the removable radiator heads having hinged filler caps. The radiators are suspended on springs to minimize vibratory stresses. Radiation is enhanced by fans driven by wide belts, the belt pulleys being on ball bearings with means for adjusting the tension.

Other General Details.

The carburetor is a White design, mounted at the left sides of the engines, the air intakes being connected with stoves to the exhaust pipes. The fuel is regulated by throttle valves and is fed by a vacuum system. The ignition is by high tension magnetos on the right sides of the engines.

The clutches are single plate types, operating in oil and can be easily adjusted. The transmission gearsets are selective types, having four forward speed ratios. The drive to the rear axle is by shaft with universal joints at either ends.

The front axles are steel drop forged I sections, with heavy steering knuckles. The frames are a standard I beam type with bumpers ahead of the radiator.

The springs are semi-elliptical, mounted under the frames. The wheels are cast metal. The wheelbase is 174 inches for both chassis. The tires are 36 by 5-inch forward and 40 by 5-inch dual rear for the three-ton chassis, and 36 by 6-inch forward and 40 by 6-inch dual rear for the five-ton chassis.

The control is by White special type worm and sector type gears, with ball thrust bearings at the left side, with the usual foot and hand levers. The service brake, operated by foot pedal, acts on

drums on the driving shaft, and is supported by frame cross members. The emergency brake shoes operate within drums on the rear wheels. The rear axle clearance is 13 inches and the length of the frame back of the driver's seat is 13 feet one inch.

All chassis are equipped with driver's seat and cushions, front fenders, oil dash and tail lamps, warning signal, jack and complete set of tools. Deliveries will be begun as soon as the factory production supplies war demands that are extremely urgent.

WILLYS-OVERLAND BUSY ON \$75,000,000 WAR CONTRACTS.

The plant of the Willys-Overland Co., Toledo, O., at the end of the year will be working 100 per cent. on war contracts, and the orders that are to be filled will aggregate in value approximately \$75,000,000. One of the latest orders received is for 5000 12-cylinder Liberty airplane engines. The plant is now producing or will shortly produce Curtiss engines, chassis for two-man tanks for the English government, gun carriages, shell and other munitions. The expectation is that the company will shortly have 20,000 workers busy at its plant.

NEW YORK TRAFFIC CONTROL.

The monthly meeting of the Motor Truck Association of America, to be held the evening of Oct. 23 at the Automobile Club of America, will be given over to a consideration of street traffic. The members will be addressed by Dr. John A. Harris, special deputy police commissioner in charge of street traffic, and Inspector John O'Brien, who commands the traffic squad of the New York City police department.

HALL GOES TO SWINEHART.

H. L. Hall became on Oct. 1 manager of the Chicago branch of the Swinehart Tire and Rubber Co., operating in central western territory. He was formerly for eight years manager of sales in the western district for the Troy Carriage Sunshade Co., Troy, O.

MARYLAND LICENSE GRAB IS PROTESTED BY OWNERS.

The Pennsylvania Council of National Defense has received the protest of truck owners of that state against the demand of the state officials of Maryland, that trucks entering that state shall pay the full license fee required of residents. Maryland has a reciprocity clause in its statute regulating the use of power vehicles, granting to the residents of other states the same privileges granted to Maryland residents by those states. This clause has been repudiated.

Through Chairman Frank J. Lanahan of the division of motors and motor transportation of the Pennsylvania Council of National Defense, the matter has been taken officially to the Highways Transport Committee, and through that body to the War Industries Board and the National Council of Defense. Thus it becomes a national problem instead of an issue between two states, for practically all states are concerned alike in the outcome.

WHITE DEAD OF INFLUENZA.

James L. White, assistant general manager for the Cole Motor Car Co., died recently at his home at Toledo of influenza, contracted while at Washington, where, with Sales Manager Roberts of the company he was called for conference with government officials. Mr. White was 32 years of age. About a year ago he was promoted from purchasing agent and had charge of all production. Before joining the Cole company he was with the Northway Motor and Manufacturing Co., Detroit.

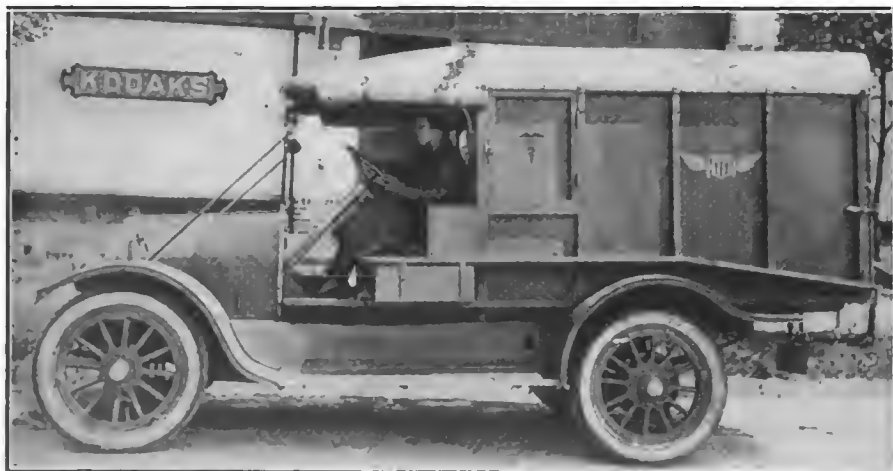
STEAM AIRPLANE ENGINE.

Dean M. Solenberger, Omar Sutter and F. G. Ferguson of Benton Harbor, Mich., automobile mechanics, have developed a steam engine they maintain is more durable and better suited for airplane service than internal explosion engines, and that it can be operated with any kind of fuel. They have offered to demonstrate the value of the engine to the government.

VULCAN DISPLAY RACK.

The Jenkins Vulcan Spring Co., Richmond, Ind., is operating a very efficient service for dealers and vehicle owners. One of the helps for dealers, which has made the service distinctive, is a special rack for display of Vulcan springs, which is sent free with an assortment of springs, and which contributes materially to general promotion and buying.

Governmental contracts for solid tires are now being filled by the Firestone Tire and Rubber Co., Indian Tire and Rubber Co., New Brunswick, N. J.; United States Tire Co., Hood Tire Co., Watertown, Mass.; Goodyear Tire and Rubber Co. and B. F. Goodrich Rubber Co.



The Overland Ambulance, Driven and Maintained by Lieut. Dorothy Leith of the Women's Motor Corps of America.



An O. K. You May Depend On

WHEN our engineer O. K.'s the specifications, you may be certain of the faithful performance of that ball bearing. For he knows the problem of a huge assembly of intricate mechanisms. He realizes that once in service that machine is wholly dependent on the Hess-Bright Ball Bearing with which it is equipped. And we know *that* is our responsibility.

So we build performance and excess strength into each Hess-Bright Ball Bearing. And it is by such foresight and care that they are accepted as standard.

THE HESS-BRIGHT MANUFACTURING CO.

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MOORE'S MUD HOLE SKID.

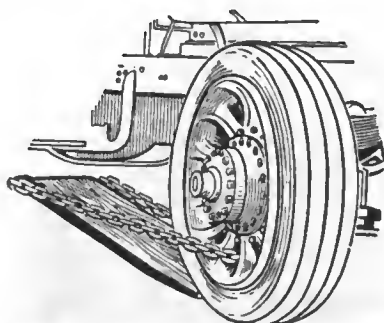
A patented device, known as Moore's Mud Hole Skid, manufactured by Langley & Schultze, Louisville, Ky., is, as the name implies, intended for use with any power vehicle; utilizing the driving effort to extricate it wherever traction is not normally obtainable. Statement is made that it is an exceptional utility with any truck, because it can be carried and be always available, and that it will economize time, labor, fuel, tires and perhaps repairs. The accompanying illustration shows the device and manner of using it. With a pair of the Moore skids any emergency can be met.



Moore's Mud Hole Skid.

The skid is a section of plank with one end tapered so it may be forced into mud or sand, that is strengthened by a binding band of heavy metal. At the other end of the plank, retained by two stout clamps, is an iron bar, the ends of which are turned at right angles to the main section and carry rings. One end of a chain more than twice the length of the skid is secured to one of these rings, and at the other end of the chain is a hook.

When used the tapered end of the skid is forced under the tire of a driving wheel that has no traction. The chain is carried between spokes back of the axle center so there will be draft upon it as the wheel is turned. The other



Mud Hole Skid with Chain Attached to Wheel, This Giving Positive Traction.

end of the chain is hooked to the ring at the broad end of the skid, and the slack taken up. When the engine is started the turning of the wheel will wind the chain on the brake drum and the wheel will roll along the skid. After the wheel is well on the skid and traction is positive the chain is cast off.

PHILIP E. HAWLEY, DEAD.

Philip E. Hawley, head of the Hawley-Cowan Co., Boston, which firm is the New England distributor for Wilson trucks, died recently at his home at Boston of pneumonia, superinduced by influenza. He was widely known in the industry and trade and was at one time a resident of Detroit. For several years he dealt exclusively in passenger cars.

TRUCK SALES MANAGERS TO FORM ORGANIZATION.

At the Statler Hotel, Cleveland, O., a meeting will be held Oct. 18 by a considerable number of sales managers of power truck companies, for the purpose of forming a permanent organization. The proposition to form a body that will be representative and include a large number, perhaps all of the principal concerns of the industry, has been considered to some extent and there is belief that substantial benefits can obtain through cooperative endeavor and unity on subjects of importance to the manufacturers, distributors and the trade, as well as reflecting to a material extent upon owners. J. E. Tracy, sales manager of the Sterling Motor Truck Co., Milwaukee, Wis., is the chairman of the temporary committee that has called the meeting.

WAINWRIGHT IS A LIEUTENANT COLONEL.

Lieutenant colonel is now the rank of Guy A. Wainwright, who retired as vice president of the Diamond Chain and Manufacturing Co., Indianapolis, Ind., to join Battery A, Indiana National Guard, as a private in 1916. He served on the Mexican border and was made a top sergeant. He was major of the 150th Field Artillery when that command went across the ocean in October, 1917, and in the year following was with his battalion in the Second Division. He participated in numerous engagements and was recently promoted.

A contract for 1500 Curtiss OX-5 engines, for use in training airplanes, is being filled by the Wiiffs-Overland Co., Toledo, O.

NEW TRADE LITERATURE

How to Keep Tab on Your Truck is the title of an interesting bit of literature distributed by the Service Recorder Co., Cleveland, O., which impresses upon the reader the necessity of keeping accurate record of truck time and labor, and how positively this can be done with the Servis Recorder. Examples of charted results and conclusions from them by which economies can undoubtedly be obtained are graphically presented.

The Titan Ability Guarantee, published by the Titan Truck Co., Milwaukee, Wis., describes and illustrates the manner of testing every chassis built before delivery by a long drive and a final climb of the 19th street hill, an ascent 500 feet long, having 20 per cent. grade for two-thirds of its length and 25 per cent. for the remainder. The guarantee to the purchaser is that this factory test shall be repeated within 90 days of delivery without overheating and at the standard governed engine speed, in addition to the warranty of the N. A. C. C., and there is a further warrant of the internal gears of the rear axle against breakage or undue wear for a period of two years from factory shipment.

Over Here is the caption of a clever article in the *Quieterion*, published monthly by the Hyatt Roller Bearing Co., and edited by B. G. Koether, which has as its purpose emphasizing the duty that is incumbent upon all who are not overseas engaged in the important work of suppressing the Hun, to "keep the home wheels turning." It is decidedly worth reading.

Highway Tire Protectors is published by the Bukolt Manufacturing Co., Stevens Point, Wis., and it is devoted to description and illustration of the uses and utilities

of a sectional tire protector that is claimed to be productive of marked economies when used with any type of pneumatic shoes.

Uses of Trucks in Highway Work are dealt with to a considerable extent in the October issue of the *Concrete Highway Magazine* for October, besides the usual attention to building roads with concrete surfaces and several other more general subjects.

American Military Truck Superior to German "Blunder Bus" is a decidedly interesting article by M. W. Ferguson, efficiency engineer, in the latest issue of "Transportation," a magazine published by the Moreland Motor Truck Co., Los Angeles, Cal., in which comparison is made of mechanical design and construction of a German army truck and a Liberty truck that has been standardized for the War Department and to meet army service needs.

Red, White and Blue colors emphasize a capitolly designed folder distributed by the All-American Truck Co., Chicago, that is decidedly in keeping with the patriotic policy of the company and the trade name of the standardized truck it builds.

Truck Talk, the monthly magazine of the General Motors Truck Co., has much common sense expressed in the leading article of the latest number, entitled "Full Loads Both Going and Coming," which deals practically with the desirability of owners obtaining the greatest ratio of productive truck mileage. The number also presents a handsome two-page illustration of the three-quarter ton GMC chassis that is now the standard for all government trucks of this capacity.

The Coal Question and the Motor Truck

One of the biggest problems in connection with solving the coal question is transportation to the retail dealer and delivery to the consumer.

With motor trucks, the retail coal dealer can deliver more coal, distribute over a wider area, and at a lower delivery cost per ton.

The use of motor trucks for coal deliveries means increased profit for the dealer and better service for the consumer. They can and are doing heroic service in helping to solve the question of the winter's coal.

In selecting motor trucks for coal deliveries or for any other heavy service, the wise buyer will demand the sturdiest possible construction all the way through, and he will pay particular attention to the steering gear.

If he finds that the truck is equipped with a Ross Steering Gear, he knows that the enormous bearing surface in Ross design, together with Ross quality in materials and workmanship, guarantee safety, reliability and easy operation.

He has greater assurance, also, of the merit of the rest of the truck, as it is reasonable to suppose that the manufacturer who uses Ross Gears has given the same careful consideration to every detail in the construction of his truck.

Ross Steering Gears are now used as standard equipment on 115 different motor trucks, representing considerably over half the industry. Write for catalog and further information.

Retail Coal Dealers—

Use Motor Trucks

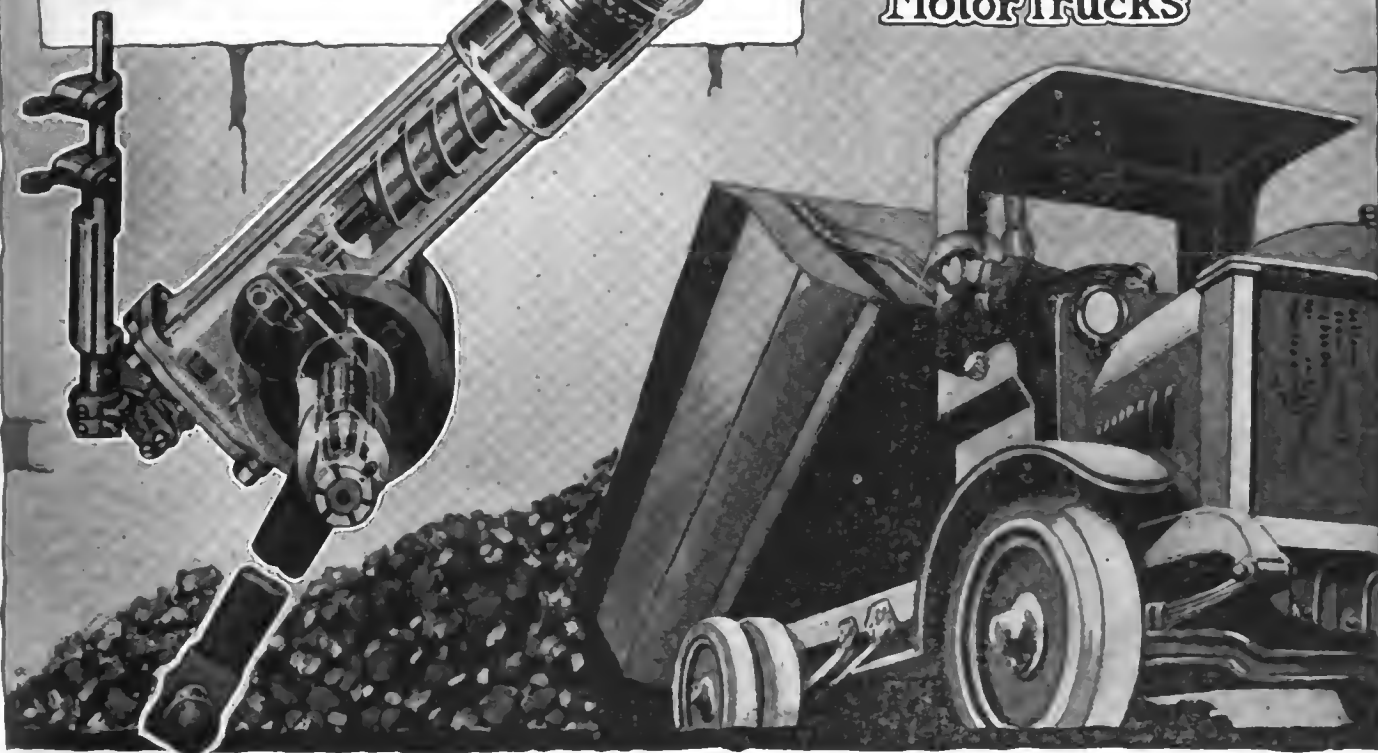
Consumers—

Buy Your Coal Now

Each One Must Do His Part

ROSS GEARS

The Steering Gears
that
PREDOMINATE
on
Motor Trucks



ROSS GEAR & TOOL COMPANY, 790 Heath St., Lafayette, Ind.

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

GROWTH OF RURAL MOTOR EXPRESS

THE activities of the Highways Transport Committee may be said to cover the entire nation. This has been accomplished through the regional organization recently effected, by which the United States are divided into 11 regions, each of which is under the supervision of a regional committee, the head of which is a chairman. These regions, through the regional committee, form state committees, and perhaps district committees, so that there is a chain of organizations, each of which is promoting highway vehicle transportation.

The Highways Transport Committee is stimulating rural motor express haulage, return loads bureau haulage, store-to-door delivery, and the relief of railroad congestion through long distance freightage. In some instances the state organizations have sought to bring about restriction of delivery by merchants, co-operative delivery, and to establish various agencies that would encourage the use of power vehicles for transportation.

The nation is divided into the following regions by the Highways Transport Committee:

Region No. 1, all of New England save Connecticut.

Region No. 2, New York and Connecticut.

Region No. 3, Pennsylvania, New Jersey, Delaware, Maryland, Virginia and District of Columbia.

Region No. 4, North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama and Mississippi.

Region No. 5, Michigan, Ohio, West Virginia, Indiana and Kentucky.

Region No. 6, Wisconsin, Illinois, Iowa, Missouri, Kansas and Nebraska.

Region No. 7, Minnesota, North Dakota, South Dakota and Montana.

Region No. 8, Arkansas, Louisiana, Oklahoma and Texas.

Region No. 9, Wyoming, Colorado, Utah and New Mexico.

Region No. 10, Washington, Idaho and Oregon.

Region No. 11, Nevada, California and Arizona.

The chairman of the several regions are the following:

Region No. 1, J. Randolph Coolidge, Jr., Boston; Region No. 2, George H. Pride, New York City; Region No. 3, C. A. Musselman, Philadelphia; Region No. 4, Tom Winn, Atlanta; Region No. 5, Harry L. Gordon, Cincinnati; Region No. 6, John T. Stockton, Chicago; Region No. 7, Earle Brown, Minneapolis; Region No. 8, J. F. Witt, Dallas; Region No. 9, Tom Botterill, Denver; Region No. 10, Julius L. Meier, Portland; Region No. 11, L. A. Nares, Fresno.

The Highways Transport Committee is now preparing to take up with the highway departments of the different states the removal of snow from the main roads during the winter, the committee's aid being asked by Col. Charles S. Drake, chief, Motor Transport Corps, U. S. A. The states of Pennsylvania, New York, Ohio, Illinois, Indiana, Michigan, New Jersey, Massachusetts, Connecticut, Delaware and Maryland will be asked to engage in this snow removal work. Lieutenant Colonel W. D. Uhler of the Highways Transport Corps has outlined a plan of motor transportation over three main routes, one originating at Chicago, one at Detroit and one at Buffalo, all converging at Baltimore. The weather bureau will make forecasts at different observation points in the territory to be covered by the routes, at least three days in advance of starting the trains. Col. Drake suggests that the routes be as direct as possible, that from Alma, Mich., via Detroit, and that from Buffalo via Albany.

S. A. Miles of the National Automobile Chamber of Commerce, who has

been working to promote the organization of rural express routes for a number of months, maintains that his organization has interested many members of the N. A. C. C., a vast number of dealers, county agents, food administrators, highway departments, chambers of commerce, boards of trade, bankers, merchants and farmers. The formation of companies and operation of routes has been so rapid that the records have not kept pace and an accurate estimate of results is not practically possible. He believed the establishment of rural express companies had impelled the buying of 500 or more trucks, and that unless government restriction prevents there is prospect of enormous increase.

Correspondence on file showed the sale of 100 trucks, at least 200 more trucks had been bought, the International Harvester Co. alone selling between 30 and 40 machines in Iowa and expected to close sales for 150 more in and about Cedar Rapids. The work called for voluminous correspondence, but this had been immensely productive and many dealers had been impelled to become agents for trucks and add their energies to the movement. Some of the dealers had done very good work.

Standardization of rates has been difficult and no recommendation could be made as yet. Cooperation in determining rates was expected from several states and the Public Utilities Commission of New York state.

WILL USE KEROSENE FUEL.

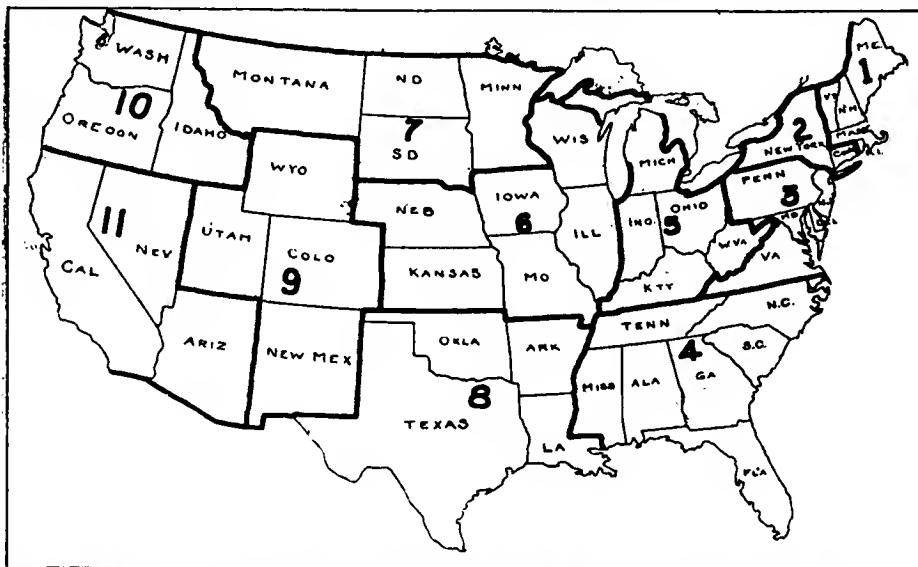
The possibility of shortage of gasoline and no doubt the belief that the price will also advance in ratio to the demand, has impelled the Fifth Avenue Coach Co., which operates the motor 'bus service in New York City, to plan to equip its machines for using kerosene.

The expectation of the company's engineers is that with new carburetor equipment a very material economy can be obtained, which will justify the expense of converting the carbureting system of each engine, there will be insurance against delay if the supply of gasoline is necessarily curtailed, and that the machines can be practically operated.

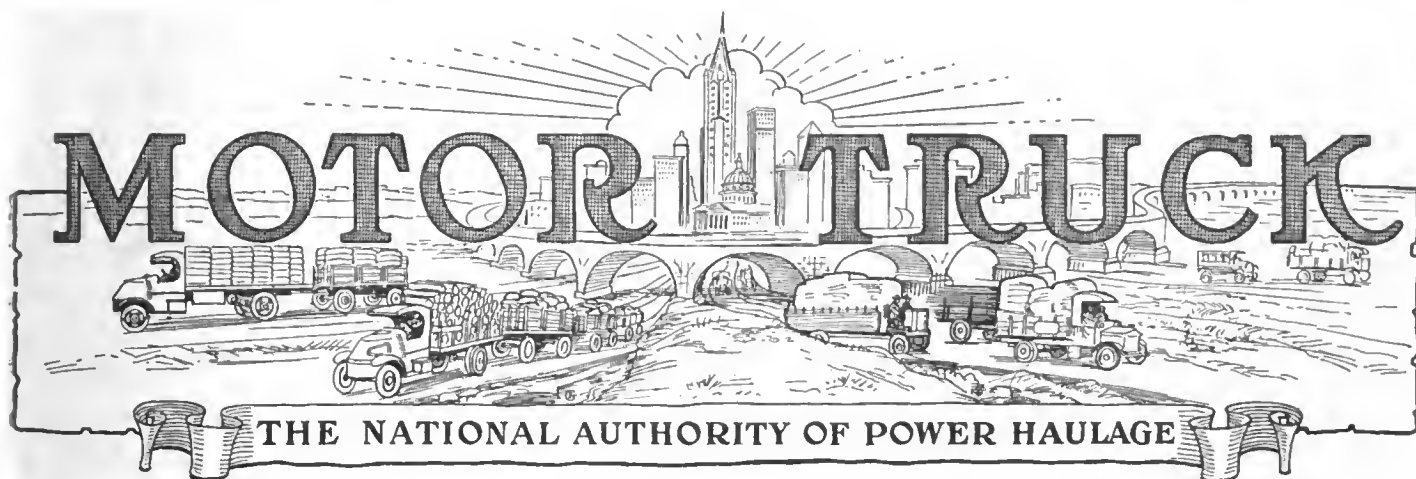
LARGE MAXWELL EARNINGS.

The net income of the Maxwell Motor Co. for the year ending July 31, before providing for the excess profits tax or for the corporation income tax in excess of six per cent., will be about \$2,400,000, according to H. S. Sanderson, a director.

Quarterly dividends of \$1.50 a share on preferred stock and \$3 a share on common stock, payable Nov. 1 to stockholders of record Oct. 4, have been declared by the General Motors Corporation.



Map Showing the 11 Regional Districts of the United States Organized by the Highways Transport Committee for Haulage Promotion.



Vol. IX. No. 11.

PAWTUCKET, R. I.

NOVEMBER, 1918

TRUCK EFFICIENCY HIGHEST IN ROUTE-PICKUP WORK

James L. Drury, Driver for What Cheer Chemical Co., Pawtucket, R. I., with Nearest Perfect Record of 1760 Participating in Packard National Test, Averaged More Than a Stop a Mile

PRACTICALLY every owner of a power truck will affirm, if questioned, that the largest measure of economy is obtainable where loads are capacity, the hauls long and the stops few, and state this with such confidence that one cannot controvert it with facts applied generally. The logic of such a conclusion will not be denied, even by the best informed, and for this reason the result of the National Truck Efficiency Test, organized by the Packard Motor Car Co., and participated in and completed by 1760 different truck drivers, has deep significance for those who are interested in highway haulage economies.

This competition proved that this belief is not well founded, because the truck that made the best showing of the entire number and irrespective of class or size, was one driven daily over routes where the number of stops to pick up its loads range from 22 to 59 a day, the daily average being 39.33. These are regular

calls, and generally others are made, which vary with conditions. The extra stops may be from three to 10 or a dozen. This statement does not apply to stops that may be made for other causes.

for the routes and 12 miles a day for additional haulage, a total of 44 miles. One will understand that the average route work necessitated an average of 1.23 stops to the mile, and the extra work stops were sufficiently numerous to make the average at least one a mile.

When these facts are considered and the result contrasted with the work of other trucks where the stops were very few and the hauls comparatively long, there can be but one conclusion—that the generally accepted supposition relative to the economy of long hauls is disproven, and so effectually that there can be no doubt in the minds of those who are informed of the facts.

There is the best of reason for emphasizing the result stated. For years owners of highway transportation equip-

ment have believed that power trucks were not economical for work where many stops were made and the mileage comparatively low. They have stated with supreme assurance that they knew from facts that



Driver James L. Drury and the Packard 1 1/2-Ton Truck with Which He Won First Owner's and Driver's Prizes in Class A, Packard National Efficiency Test, and Made the Best Record of 1760 Contestants, Irrespective of Class.

The truck is driven approximately 800 miles a month in route work and 300 miles a month in extra work (the extra work necessitating additional stops), which gives an average of 32 miles daily

were well established. They applied their own measures, which they confidently accepted, and were willing to be guided by their own judgment.

The record, which is in part the subject of this article, was not an accident. It was continued for three full months—a sufficient period to demonstrate that it could be continued for any desired period of time. But the record also very conclusively established that a very large part of the economy—in fact, practically all of it—was due to the willingness to work and the driving skill of the young man who was in charge of the truck.

Purpose of the Contest.

The National Truck Efficiency Test was organized by the Packard Motor Car Co., according to its statement, primarily to arouse practical response to an appeal for better trucking made by the Council of National Defense and the War Industries Board, and to demonstrate on the road methods of getting better results in motor truck transportation. An-

efficiency and economy being of considerable proportions, the participants were limited to owners and drivers of Packard trucks, which were divided into three classes: Class A, 1½ and two-ton trucks; Class B, three and four-ton trucks, and Class C, five and six-ton trucks.

The winner of the contest, on the basis of making the best showing of any machine, was the 1½-ton Packard truck owned by the What Cheer Chemical Co., Pawtucket, R. I., which carried off the owner's and driver's first prizes in Class A. Similar prizes were awarded for the entrants in classes B and C, but with a percentage of 952 out of a possible 1000 points, the What Cheer truck, driven by James L. Drury, was ahead of all others.

The percentages of the other contestants have not been made public, but the statement of the Packard Motor Car Co. was: "Mr. Drury's record, in addition to winning first award in Class A—1½ and two-ton trucks—was better than that made by any other contestant irrespec-

The trial was begun with a set of front tires that had been installed about Sept. 15, 1917, and a set of rear tires that had been installed about Nov. 15 of the same year, which had been driven approximately 9900 and 7700 miles respectively. The shoes were in good condition, but they had at that time a mileage probably equal to what would be regarded as full service by many drivers and owners. Had the What Cheer Chemical Co. and Driver Drury wanted to have the greatest insurance against possible tire expense new shoes could have been installed before the contest was commenced, but this was not considered.

Practically the only change of equipment was in the installation of a set of a type of spark plugs which was believed very efficient. The truck was in normal condition and there were no special adjustments or changes.

Plant Renders Animal Waste.

The What Cheer Chemical Co. has a plant in Grotto avenue, Pawtucket, and it



The Plant of the What Cheer Chemical Co., Grotto Avenue, Pawtucket, R. I., Manufacturer of Oleo Products and Fertilizers, and a Part of the Fleet of Trucks Used by It for Collection and Delivery.

other object was to impress on owners and drivers the importance of keeping an accurate cost record, all competitors being required to use the so-called national standard forms perfected by the Truck Owners Conference, Inc.

There was an appeal to patriotism in the competition, and the belief that others might be impelled to participate prompted 1038 owners and 1857 drivers to engage in it, and the total to complete it was 1760, or 95 per cent. This was an exceptionally good showing—in fact much better than was anticipated by those who undertook the work, because each driver competing added to his own duties by carrying out the requirements with reference to records and work was added to that of those who compiled the sheets made up from the daily reports made by the drivers.

Limited to Packard Trucks.

The competition being organized by the Packard Motor Car Co. and the awards offered for continued demonstration of

tive of size of truck." This is referred to so that there shall be no assumption that class alone was specified.

Truck Used Without Overhaul.

The work of this particular truck and Driver Drury was remarkable from the fact that the machine had been in service nearly two years when the contest was begun. The truck was delivered July 29, 1916, and the competition was inaugurated June 1, 1918. The truck had never been overhauled and it has been driven very close to if not quite 25,000 miles. Without special preparation in the way of restoration or even adjustment, the truck was used for three months by Mr. Drury, and not until the close of the test was an overhaul made. The company owns a 3½-ton Packard truck that had been in service but a few months when the competition started, but Driver Drury preferred to take his chances with the truck that he had driven in his regular work and which he knows as few men know machinery.

is engaged in the manufacture of varying products made from animal waste that is collected principally from markets. These consist of fertilizers, such as ground bone, ground rendered scrap, dried blood and varying mixtures of these; edible and inedible tallow, mill soaps, cotton softeners, sizes, oleo oil, stearine and the like. The plant has several departments, each of which is devoted to production of one or more specialties.

Broadly speaking the works may be described as a rendering plant, at which all the waste from edible animal food is reduced to a product that has a distinct utility and which can only be obtained by heating to temperatures which will cause it to liquify. When all oils have been rendered these are utilized for differing products and the residuums are made into fertilizers. The company wastes nothing, practically everything being made into something that has commercial value, and in several instances



The Garage of the What Cheer Chemical Co., on the West Side of the Yard of the Plant, Having Storage Capacity for 16 Trucks. This Building is Practically Fire-proof and in Two Sections.

at least the reduction is carried through two or three or even more processes to recover what in the aggregate will add to the revenue.

Collects Waste in Several Cities.

The company has contracts with different animal food markets in Pawtucket and vicinity in Rhode Island, in Fall River and Boston, Mass., to purchase all waste that is not saleable for food, and this is collected and brought to the works at Pawtucket for reduction. All stores that deal in fresh meats have accumulations of bone, fat and parts that are not regarded as edible, which vary with the volume of business done, and for obvious reasons these must be disposed of. The company sends its vehicles to these markets and the waste is sorted, weighed and removed to the works, where it is reduced to such products as have been specified.

In this work the company operates 11 trucks ranging in capacity from 1500 to 7000 pounds, and in addition deliveries are made and freight is hauled with these machines. The fleet is mixed in that the company has not standardized on make of equipment. The vehicles used consist of two Reo 1500-pound trucks, six Federal 3000-pound trucks, one Packard 1½-ton truck, one Packard 3½-ton truck and one Garford 6000-pound truck. These have been, of course, used for varying lengths of time, but surprising as the statement may appear the company has used trucks for about 10 years, and it is now working all the machines it has purchased save the first, which was disposed of after two years use. In other words, the trucks range in service from about eight years to six months.

Seven Trucks Work from Plant.

That the reader shall understand references to localities made in connection with the use of the trucks, statement should be made that Providence is the largest city in Rhode Island and it is the center of a group of four cities, Pawtucket and Central Falls at the north and Cranston at the south, with the towns of

East Providence at the east, North Providence, Cumberland and Lincoln at the north, and Johnston at the west, with combined population of close to 500,000. In these different towns and cities are localities differentiated by names familiar enough to residents, but having no significance otherwise, so that for the purpose of designating routes statement will be made relative to cities and towns instead of local sections.

The company uses seven trucks in its work from the Pawtucket plant, these being the Packard 1½ and 3½-ton trucks, the four Federal 1½-ton trucks and the Garford three-ton truck. The total load capacity (rated) of these machines is 14 tons. At Boston it uses two Federal 1½-ton trucks and a Reo 1500-pound truck, and at Fall River a Reo 1500-pound truck.

These trucks are all used for collecting

food market waste, and they are operated practically all to the same system. A description of the work done by the small Packard machine driven by Drury will apply to all the others. The company's contracts with markets requires the collection and removal of the waste at stated intervals, ranging from two to six calls a week, these being dependent upon the business done and the accumulations. But in addition to these regular calls special calls are made whenever there is a sufficient volume accumulated and the need of space demands.

Route Stops Are Numerous.

Some of the markets have collections made each day, and generally these are during the early morning hours when there is the least interference with the business. These are usually in the business districts and many of the markets are close together, so that the stops are frequent and the distances between are comparatively small. The intervals between stops increase in the residential sections and the suburbs and in some of the villages they may be one or more miles apart.

The contracts may be such that the waste is weighed and paid for by the driver, or weighed and payment made through the company's office at specified intervals. But in each instance the driver must sort the waste, because of differing values, and when sorted it is placed in different receptacles, each quality being kept separate. Each truck carries a series of large barrels that are covered with heavy metal caps. The collections for each stop will vary greatly in volume, sometimes being less than 10 pounds and at times as much as 1500 pounds for a day. There is no measure by which the collection can be gauged, because the business of the market is variable. There will be more waste with the character and quality of the meat cut, and as meats are decidedly perishable there will be considerable variation due to temperature changes.



The Oleo Product Department of the What Cheer Chemical Co., in Which Food Animal Waste Is Rendered and Converted Into Edible Forms or Prepared for Further Combination.



The Winners in Class A. Packard National Truck Efficiency Test, from Left to Right: Driver James L. Drury, President and Treasurer E. J. McCaffrey and General Manager Thomas F. McCaffrey of the What Cheer Chemical Co.

The length of time of a stop is dependent upon the accumulation, for it must be first of all sorted, each quality weighed and placed in a container in the truck, and, as might be assumed, the driver will require from possibly three minutes to perhaps a quarter hour or more, dependent upon the poundage handled.

Driver Must Buy Loads.

In one sense the driver is a buyer, for he grades the waste and decides the qualities, and weighs each lot separately. To do his work satisfactorily he must be careful, and while he must consider the plant requirements and interests of the company, he must also deal fairly with the customers, for there is the keenest kind of competition in the business and he must see that the contract terms are met.

The drivers start from the plant at 7 each morning and whatever time is necessary is given to the collections in the business sections of each city, that there shall be no interruption of the service for customers. When these calls have been made the residential sections and suburbs are covered. The routes are carefully planned, that there shall be no unnecessary mileage driven, and these are made up for each day so that the calls will be made to make collections as may be specified.

Taking Drury's route as an example: This is very generally in Providence, he going to all parts of it, but covering some parts of Cranston and the mill villages in the Woonasquatucket river valley in the town of Johnston. He drives an average of 300 miles a month in regular route work, this making an average of 32 miles a day, but the actual daily mileages will differ considerably, there being about 20 miles difference between the maximum and minimum.

Stops Average 39.33 a Day.

The regular schedule of stops for Drury's route are as follows: Monday, 59; Tuesday, 40; Wednesday, 30; Thursday, 22; Friday, 56; Saturday, 29; a total of 236 a week, or a daily average of 39.33. Thursday's route is short because the majority of markets close the afternoon of that day. Monday and Friday are the largest days in total number of stops, but Wednesday with but 30 calls is large in the sense of volume of pound-

age collected. The Saturday route work is finished comparatively early from the fact that the markets do the largest business of the week that day and too much time would be required to make calls during the afternoon, as well as the collections interrupting the trade. Because of the relatively few calls Saturday the Monday route is longest of all in number of stops.

Despite the fact that Drury has the average daily mileage stated, this does not represent all his work. He returns to the plant after covering his route and making all special stops, and does enough additional work to drive an average of 300 miles a month in addition, or a total of 1100, this bringing the daily average to 44. This is an annual total of 13,300 on the basis of average, but probably 13,500 is about the actual figure.

Full Loads Much Exceed Rating.

There are times when Drury makes long trips during the days when he has a few hours, occasionally going to Boston and frequently making deliveries to the mills within a radius of 20 miles of the plant. For regular work he starts with 12 barrels, which, with the metal covers and the separating plank between the two rows, will weigh 1200 pounds. As the load is accumulated he will have a freight that will total from 4500 to 5200 pounds, which is seemingly a heavy overload. The routes are all arranged so that when fully loaded he will have but a comparatively short distance to drive, from one to five miles, and so as a matter of fact the heavy freight is hauled a very small part of the route.

Drury is a careful driver. His record proves this beyond question. He drives his machine with an ease that surprises those who understand truck and power vehicle operation, and his judgment of speed and distance is extremely accurate. He is a wonderfully finished driver in the sense of control, and he handles a truck with certainty as to movement that is rarely attained by men who are considered experts.

Drury Uses Motor Carefully.

He uses his truck so well that though it had been driven 22 months and more than 24,000 miles, he began the competition without an overhaul and the test in which he made so remarkable a showing with no more preparation than ordinary adjustments and the installation of a set of Derf spark plugs, which he decided he would use. Perhaps one of the best evidences of his careful driving is the fact that he had the truck brakes relined but once since it was placed in service.

In marking records it should be noted that the "Point Basis" established represents 100% performance. The different items in each record will be rated according to the share of 100% for that item which they have attained. Example: Owner 157 may attain 70 points of the possible 100 for "fuel efficiency."

GREATEST EFFICIENCY IN TRUCK.

Time—	Point Basis	Notations	Rating
Least time available, but not used.....	80		65
Least time laid up for repairs.....	60		60
Greatest time running.....	30		30
Least loading time.....	40		40
Greatest number of trips or customers per day.....	100		109
Best speed in miles per hour.....	20		18
Total.....			330
Loads—			
Best per cent. of capacity load.....	50		46
Highest daily unit mileage (compare only like units).....	40		40
Total.....			90
Performance—			
Highest fuel efficiency.....	100		100
Highest oil efficiency.....	50		50
Highest daily mileage.....	50		45
Total.....			200
Expense—			
Best paid driver.....	40		37
Lowest cost per day.....	50		44
Fairest depreciation basis.....	50		50
Lowest cost per unit mile (compare only like units).....	90		82
Most complete overhead cost.....	30		20
Total.....			260

GREATEST EFFICIENCY IN USE OF SYSTEM.

Completeness of record.....	50	50
Accuracy in keeping record.....	50	48
Neatness in keeping record.....	20	17
Total.....	120	952
Grand total.....	1000	

and the tires he now has on had been well worn when the contest was begun. These are United States tires, and the forward set (34 by 4) have been driven more than 13,000 miles, and the rear set (34 by 6) have been driven more than 11,000 miles.

When participation in the contest was proposed to President E. J. McCaffrey by a representative of the Packard company, he suggested to Mr. Drury that they do their part because of the patriotic example, and there was no belief that the well used truck and its driver would make the best showing. There was realization that if it were engaged in it should be carried through. The route work of Driver Drury necessitated very voluminous record, and he agreed to keep this up with the assistance of a bookkeeper. About a month after the contest had been begun the bookkeeper was drafted and the entire work was carried along by Mr. Drury until he could receive assistance from a new bookkeeper, which was near the end of the test. Drury gave over a vacation to do his part and he worked evenings and Sundays to keep up with it. He undertook to do all the work that was possible for him to do, and he watched his truck and not only favored it so as to insure against wear and repair, but he drove with care to keep the consumption of fuel and oil to the minimum.

How well he succeeded may be judged from the fact that he averaged from 10½ to 11½ miles to the gallon of gasoline and he used but eight quarts of engine oil a month. Considering the freights hauled, the many stops and the traffic through which he drives in making collections in the section of the city where there is the heaviest traffic of the state, the record for the contest is more than exceptional. The truck was driven with Soconv gasoline and Polarine engine oil.

Scored 952 Points Out of 1000.

Those who participated in the contest and kept records will realize that the men who were winners had to be alive every minute of the time to whatever would economize operating expense, and according to the rating of the judges of the contest Mr. Drury was entitled to 952 points out of possible 1000. The accompanying record will establish the facts in detail, but Mr. Drury was awarded 837 points out of 880 for the greatest efficiency of his truck, and 115 points out of 120 for the greatest efficiency in the use of the record system.

One will note that he was perfect with no time out for repair, for the greatest running time, for the least loading time, for the greatest number of trips or customers a day, for the highest daily unit mileage, for highest fuel and oil efficiency, and the company was regarded as perfect for the fairest depreciation basis and the most complete overhead cost. The completeness of the record was also established as perfect.

No Truck Record Kept Before.

One fact in connection with the work of Mr. Drury was that he had not been required to keep such a record. He has worked for the company for 10 years and he has driven a truck practically all of

the time. He says that he had no expectation of winning and went through with the contest in very discouraging conditions, because he wanted to finish what he begun. President McCaffrey says that he entered his truck purely as a matter of patriotism and that the result has merely justified his confidence in a young man who has proven his loyalty and worth from the day he entered his employ.

Concerning the other trucks operated by the company, the work done by those operated from the Pawtucket plant parallels what is done by Mr. Drury. The driver makes collection, hauls freight to and from the freight yards, and made deliveries of mills and to purchasers of fertilizers. A considerable part of the fertilizer is delivered to farm operators, and the hauls are in all directions within a radius of 25 miles. As fertilizer can be bought through the Farmer's Exchange the majority of orders are received through this medium and sent direct to the farms, sometimes months ahead of the time of use.

The Boston Operations.

The company operates in Boston very much the same as in Providence, but stores the trucks in a downtown garage. The routes covered are comparatively short, but they are given very close attention, several collections being made a day in some instances. As the trucks are loaded they are driven to the New Haven railroad freight yard, where the containers are transferred to a freight car, and empty barrels are taken from a storehouse as needed. In this way a very large volume of the animal waste is collected each day. The collections for each day are shipped each night and are received the following morning at Pawtucket, where the car or cars are unloaded and the barrels hauled to the plant.

The tonnage shipped from Boston is considerable and freightage is regarded as cheaper than trucking, but in the event of railroad delays, car shortage and other reason for retardation of traffic the trucks are sent over the road from Boston to Pawtucket, a distance of more than 40 miles, generally carrying heavy freights. These emergency trips are not infrequent, but they are not made from the belief that long distance highway haulage is more economical. One reason, to say nothing of others, is the time lost that might be devoted to regular work in Boston, which must be made up and only by exceptionally long hours for the men.

Truck Makes Fall River Trips.

The company keeps one truck regularly at Fall River, which is in charge of the driver, who covers a comparatively short route, probably not exceeding 10 miles. The driver makes the collections practically the same as at Boston, shipping by freight all but a load, and this is carried over the road to the Pawtucket plant, a distance of about 22 miles. After delivery the truck is returned to Fall River. This makes the daily mileage of this machine between 50 and 60. This long haul would not be possible were not the routes so short, so that practically a good part of each afternoon can be given

to the trip to Pawtucket. There are times, of course, when the freight shipments will be considerable.

The What Cheer Chemical Co. was established 18 years ago and it has been substantially developed. Originally animal wagons were used for route work, both in Boston and Lowell, as well as Providence, but with this method of collection the routes were limited. The first truck was an experiment, but with the experience gained with this machine very satisfactory service has been obtained from all the others and the business has been substantially increased through their use. The company maintains its garage at the plant, which has capacity for 18 machines, and all ordinary repairs and adjustments are made there by an extremely expert mechanic, who has all the necessary hand tools. The larger repairs are made at the service stations of the truck agents, this from the fact that the company prefers to have the work done as quickly as is possible that it will not lose service and there will not be need of overtime work by the men.

The company keeps very accurate record of the cost of operation. The system is one that has been developed with the increase of vehicle equipment and with which good information is at all times obtainable.

CAN BUILD ONLY ESSENTIAL ROAD MACHINERY.

By order of the War Industries Board a very material curtailment must be made in the production of road building machinery for the six months beginning Oct. 1. Applied literally the order means that except where the construction is either directly or indirectly for government purposes no road building machinery can be built.

The exceptions to the order to suspend manufacture are:

- 1—Repair parts.
- 2—For work for railroads and other public utilities.
- 3—For roads repaired for the United States government, the several states and counties and municipalities.
- 4—For new construction by the United States government, either directly or indirectly.

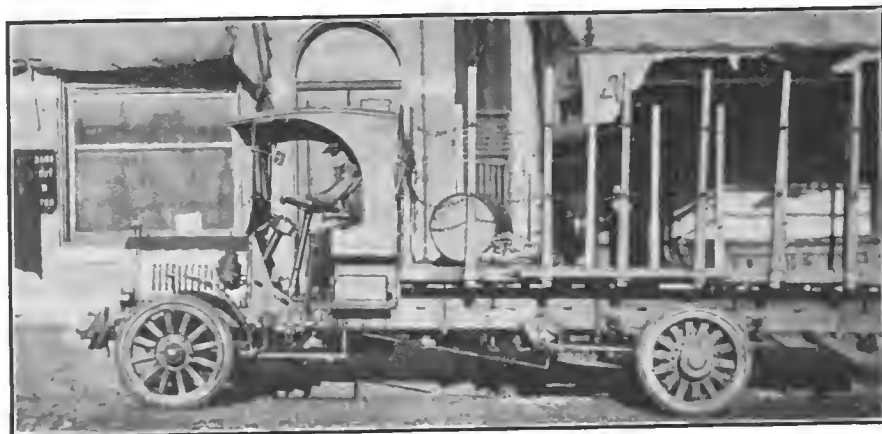
This order, which has been received by the various interests of the industry, provides that parts for the repair of road making machinery can be obtained where such machinery is to be used for the repair of highways, either for the government or for state, county or municipal order.

RAPID GROWTH OF FIRESTONE BUSINESS.

The fiscal year of the Firestone Tire and Rubber Co., Akron, O., ended Oct. 31, and an estimate of the business of the company for the year is \$75,000,000. This is an increase of \$13,500,000 over the previous fiscal year, and is more than \$55,000,000 greater than the business done in the year ending Oct. 31, 1914.

TRUCKS FOR TEXTILE MILL WORK

Concerns in Philadelphia Suburb Operating One and Two Machines Find Them Very Economical of Time, Labor and Expense



Three-Ton Packard Truck with Stake Platform Body, in the Service of Robert Krook, Yarn Manufacturer, Manayunk, Pa., That Has Proven Very Economical.

By K. H. Lansing.

NOW that textile mills in Philadelphia and vicinity not employed on government orders show a halting activity, more care than usual is being directed to keeping track of and cutting down overhead expenses.

Business in general among the carpet yarn and carpet weaving mills of the usually very active Manayunk district of that city is such that retrospects in the nature of inventories can be made without interrupting the flow of production.

In no mill section of Pennsylvania is the motorizing of equipment more noticeable than in Manayunk, where textiles of various types are produced, yarns and carpets taking the lead. While there are no large fleets of freightage trucks in use in this industry in this locality, numerous mill owners assert that now they have had time to examine their accounts carefully for given periods, the installation of one or two trucks has more than justified the expense of changing their equipment from horse drawn to power driven vehicles, and in several cases, especially among the smaller mills, the economy and increase in utility by the change have been notable.

A case in point is that of Robert Krook, manufacturer of blanket, carpet, art square and coarse cap yarns.

Like most of the Manayunk mill owners, Mr. Krook motorized his equipment at a comparatively recent date. Less than one year ago, or about the first of December Mr. Krook bought a three-ton, high stake body Packard motor truck, displacing two teams of horses and one man. The driver and his team had usually started work at 8 in the morning and continued until 5:30 in the afternoon. The truck driver begins his day's labors at the same hour in the morning, but usually is through by 2 in the afternoon, this time economy releasing the driver

for other work and giving him plenty of time for work on the truck. As the driver is an expert machinist, as well as chauffeur, Mr. Krook has a satisfying service economy in that there is very rarely a repair of any magnitude, because of careful driving, because all minor adjustments are made at once and at nominal expense, and the machine is generally ready for use. The mill has its own garage equipped with the usual hand and machine tools and other requirements of the small shop. The driver's wages are \$28.50 a week.

The Packard cost \$4300, the insurance on it amounts to \$231.70 a year and Mr. Krook reckons its depreciation at 30 per cent. yearly. At its purchase, of course, the horse team expense ceased and the wages of the second driver were saved. The time which the driver now can put in on shop, or other work, adds considerably to the saving through motorization.

The truck is driven on an average of 30 miles a day. Here are the programs for

two typically busy days at the Krook mill for the truck:

Two trips, six stops with truck running altogether nine hours, including four hours and 30 minutes loading time. Weight of load carried on trip from mill, 4100 pounds; weight of return load, 8000 pounds. Distance covered, 31 miles; gasoline consumed, six gallons, at total cost of \$1.56; cylinder oil, one pint, 40 cents. Cup grease, nominal.

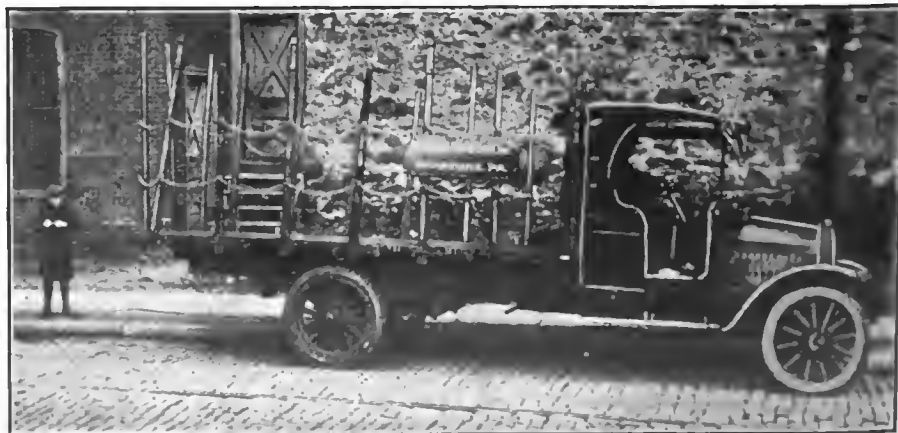
Four trips, 11 stops, running nine hours and 40 minutes, including four hours and 35 minutes loading time. Weight of yarn load from mill, 5850 pounds; weight of return load, hair and wool, 12,240 pounds. Distance covered, about 45 miles; gasoline consumed, 10 gallons, at 26 cents a gallon, or total of \$2.60; two pints of cylinder oil at 40 cents a pint, or 80 cents. Cup grease, nominal.

Mr. Krook buys his cup grease two pails at a time, paying \$1.25 a pail. One pail lasts six months. He buys cylinder oil in 150 gallon orders, thus getting a reduction in its price, so that it costs him 68 cents a gallon. Ordinarily the truck burns a gallon of gasoline to every five miles run, this fuel costing 26 cents a gallon.

Mr. Krook believes that all parts of the chassis opening in oil baths, such as the transmission gearset, should be drained at regular intervals and the oil changed to get the best results. This frequent change of oil has added at the rate of about \$10 a year to the cost of lubrication, but in certainty of service minimized repairs and more satisfactory operation of the truck, Mr. Krook believes the plan economical in the long run.

Mr. Krook, making a careful analysis through the Packard cost system, calculates that for the last six months period his Packard motor truck, including wages of driver and operating costs, outside of tire depreciation, which thus far has been only nominal, has cost him \$1150 in round figures, as against the teams \$1414 for the last six months period of their use.

But the saving and gain through the truck has been considerably more, as the machine can be used for other work



The 2½-Ton Maccar Truck, Equipped with Stake Platform Body, Operated by Richard Hey & Son, Inc., at Manayunk, Pa., for General Purposes.

after 2 p. m., as found necessary. Its utility in mill service is confined largely to making deliveries and hauling return loads of hair, wool, other material and mill supplies to the plant.

"I have made it a rule," said Mr. Krook, "not to habitually overload the truck. A man wouldn't think of overloading and overworking his teams, and truck mechanism life and energy also have limitations. Ordinarily, I make 7200 pounds the maximum load. In this way I am certain I save a considerable sum in repairs and lost time through an idle truck in business hours. The only repair of size thus far has been a leaky radiator. This repair job cost \$25 and I should put the entire cost of repairs for a year at about \$50."

Among other Manayunk textile mills comparatively recently motorized are those of John P. & J. W. Holt, who also use Packard trucks; Richard Hey & Son, Inc., who use a three-ton Maccar truck, which replaced a horse team, and a two-ton Autocar, which does the work for which a one horse team and a horse and cart were necessary.

The Autocar, in addition to other mill haulage, is used to haul coal to the plant, to take away ashes and carry mill supplies. Part of the time it hauls fabrics from the finishing room to the stock shed and warehouse. It also brings in parts and shop utensils for the garage. The Maccar truck is used to haul the finished textile products to the city and also bring back return loads of hair and wool. Another work is to carry finished products to the Wissahickon station and various other terminals and docks. The Autocar, says the mill owners, saves enough in demurrage charges alone to pay for its upkeep. Its original cost was \$1815. It has a demountable body—a threefold one—dump, stake and enclosed platform.

While industrial tractors are yet to be utilized by most of the textile mills of Manayunk as an auxiliary to the motorized transportation equipment, several concerns are contemplating using them, among which is the Imperial Woolen Co.

MCCORD MFG. CO. INCREASES ITS WORKS.

The McCord Manufacturing Co., Detroit, has just completed an addition of considerable proportions to the main plant, which has very largely increased the floor area, and when equipped the production will increase correspondingly. The addition is to be used very largely for the production of heavy duty tubular radiators for tractors and motor trucks, both during the duration of and after the war. The company estimates that its production of this type of radiator alone will be about 500 a day. The fourth floor of the addition will house the general offices and the engineering departments.

The Haynes Automobile Co., Kokomo, Ind., has begun the publication of a magazine in Spanish, entitled "El Herald Haynes," which is intended to promote the sale of Haynes machines in Spain, Mexico and Spanish speaking countries of South America.

COST OF FARM CROP HAULAGE GREATLY REDUCED WITH TRUCKS

MUCH significance attaches to statement made by Department of Agriculture concerning cost of transporting crops from the places of production or accumulation on farms, to railroad or other shipping terminals. These figures are based on reports made by correspondents of the bureau of crop estimates of the department, which are believed to be conservative. The correspondents have no interest in the character of the results. The purpose of the bureau is to determine so far as possible which form of transportation, power or animal, is best and most economical.

Such facts are not established every year. The last determination was in 1906 and readers are reminded that labor and other costs have greatly increased, so that the true economy of the power vehicle must be even greater than appears on the face of the figures.

Motor truck hauls in 1918 from farm to shipping point averaged 11.3 miles, while wagon hauls averaged nine miles;

south central, 32 cents; the east south central, 36 cents; New England and the middle Atlantic states, 38 cents; the south Atlantic states, 39 cents; and, highest of all, the Rocky Mountain states, with 42 cents a ton-mile.

In motor truck hauling the order of the different divisions of the country begins with nine cents a ton-mile for wheat in 1918 in the east north central, 10 cents in the east south central, 14 cents in New England, the middle Atlantic and the west north central, 15 cents in the west south central, 17 cents in the Pacific, 18 cents in the south Atlantic and 29 cents in the Rocky Mountain states.

Trailers Often Used.

The motor trucks generally in use by farmers are not large trucks, but small ones whose nominal capacity is usually one to two tons. In quite a number of counties throughout the country the trucks used for hauling are made-over



Loading a Three-Ton Packard Truck, with Stake Platform Body Equipment, at the Mill of John P. and W. J. Holt, Manayunk, Pa.

and a motor truck made 3.4 round trips per day over its longer route of 11.3 miles, while wagons made 1.2 round trips per day over the nine-mile distance.

The estimated cost for hauling in wagons from farm to shipping point averaged in 1918 about 30 cents a ton a mile for wheat, 33 cents for corn and 48 cents for cotton; for hauling in motor trucks or by tractors the averages are 15 cents for wheat or corn and 18 cents a ton-mile for cotton.

Motor Cost Declines.

A similar inquiry in 1906 showed an average for wagons of 19 cents per ton-mile for hauling corn or wheat and 27 cents for cotton. In 1918 wagon costs were naturally higher, since prices and wages have increased, but motor truck costs were much lower in 1918 than even the wagon costs of 1906, due to greater efficiency of the motor truck.

The cost of wagon hauling a ton-mile for wheat among the geographical divisions in 1918 was lowest in the Pacific states, 22 cents. Above this, in order, are the north central states east of the Mississippi river, with 26 cents; the west north central states, 29 cents; the west

passenger cars. In some cases light wagons are attached as trailers to ordinary passenger cars and produce is taken to market in that way. In North Dakota and California, as well as other states, tractors, each drawing several wagons, are used for hauling grain. Trailers are also used, especially in the West, with horse drawn wagons.

For the United States as a whole the average wagon load of wheat was 55 bushels in 1906 and 56 bushels in 1918, and the motor truck load in the latter year was 84 bushels. For corn the wagon loads of 1906 and 1918 were 39 bushels, and the motor truck load of 1918 was 58 bushels. The cotton load for 1906 and 1918 for wagons was 3.4 and 3.6 bales, respectively, and for motor trucks 6.6 bales in 1918.

The production plan of the Studebaker Corporation is to cease building passenger vehicles Jan. 1, when the plants will be on 100 per cent. war work. The company will continue its service department and will provide parts for replacements and repair as always.

BUILD WAR PLANT WITH TRUCKS

*Materials for Construction of Nitro, West Va.,
with Works and Homes for 17,000, Hauled
with Fleet of 50 Pierce-Arrow Machines*



This Illustrated the Conditions in Which the Trucks Were Worked, Deep Mud Much of the Time, and on Heavy Grades.

TRANSPORTATION speed has been one of the greatest factors in the prosecution of the world's war by the United States. Whatever has been undertaken has been with the expectation that the needs of the government would be more than met. The country, once it engaged in war, made preparation to meet every demand made upon it. Operations were planned so much larger than was ever before conceived that few were qualified to judge their magnitude from proportions and dimensions usually dealt with.

The United States without hesitancy required of its engineers and its industrial workers more than was ever before asked of a people by a government. With assurance that would have been regarded

as visionary in normal times the undertakings were begun and carried through with results that justified every plan. In fact proposals that were previously regarded as impossible became the commonplace.

It was engineering and the concerted work of millions that made these results possible. It was the skill and the earnest endeavors of men whose country never has met defeat that carried these undertakings to finished works, and yet all depended upon transportation, which has been more highly developed in America than in any other country of the world.

Greatest Need Is Transportation.

Events have proven that wonderful accomplishments are possible by continuous work and adequate supplies of labor

and materials—and more necessary than all else is transportation, that there shall be no cessation of production or loss of time. During the progress of the war the unparalleled constructive genius of the American people has been manifested thousands of times, and in no instance has there been reason to believe that the limitations have been reached, although the people have been forced to extremities that would not ordinarily be considered as necessary or, in many cases, even reasonable.

But winning the war has developed resourcefulness and capacities in men that would not have been dreamed of in industry in time of peace. The war time activities have proven that the future will present propositions that will be gigantic and which will be consummated as easily and as quickly as those that were stimulated by the fire of patriotism and the well nigh marvelous organization that has been created to meet this national exigency.

Wondrous Works of Industry.

Little has been told of the almost wondrous works of industry because of obvious reasons. But there is no question whatever that when the history of the world's war is written from the viewpoint of industry there will be quite as many feats of real patriotism as may be recounted by those who were on the battlefields, in the trenches, in the air or on the sea. And this statement is not meant to discount the magnificent courage and valor of Americans in actual conflict, but to emphasize the splendid unity and concerted endeavor of those who have labored for those who were fighting for a world's peace.

That its armies and navy might be supplied with ammunition the United States planned the erection of several plants for making explosives. Because of the danger incidental to all works of this character the locations for these were chosen as remote as possible from towns and cities, and yet where conditions were suited for the receipt of raw material and shipment of finished products. Among other factors considered was that of having the sites sufficiently distant from the



A Section of the Fleet of Pierce-Arrow Trucks, Supplied by the Heavy Haulage Co., New York, N. Y., to the General Contractor, the Thompson-Starrett Co., for Work at Nitro.



The Lack of Highways Was a Handicap for Haulage for Months, but the Trucks Never Lost an Hour Because of This Condition.

CONSTRUCTION MATERIALS AND EQUIPMENT TRANSPORTED.

Brick	39,950,000
Concrete, cubic yards....	185,000
Lumber, feet	75,079,000
Sewer pipe, lineal feet, 4 to 12 inch.....	199,160
Segment block, lineal feet	46,356
Cast iron water pipe, feet	343,200
Wooden water lines, feet	65,500
Plumbing fixtures	14,340
Valves	80,000
Road materials, miles macadam	12
Machinery, tons, several thousand	
Household furniture, four, five and six-room bungalows	2,000
Construction material, mess halls	10
Construction material, stores	7
Construction material, stands	22
Construction material, administration building	1

TRANSPORTATION UNITS USED.

Two-ton dump trucks.....	35
Two-ton platform trucks.....	10
Five-ton dump trucks.....	5
Horse teams, about.....	650
Oxen, yokes	17
Caterpillar tractors, small.....	30
Locomotives, standard gauge.	6
Locomotives, narrow gauge....	?
River steamer	1
Barges	11
Derrick boat	1

TRANSPORTATION WORK RECORDS.

Eight trucks hauled 500,000 brick in six days, half-mile trip, loading period 12 minutes.

Eight trucks hauled five car loads of warehouse material in 3½ hours, round trips four miles.

Five five-ton trucks hauled 300 tons of crushed stone in nine hours, three mile trips.

coast as to be reasonably secure from an enemy attack in war, and protected so far as possible from an invader by natural barriers that can be fortified and defended in the event of need.

Mammoth Plant at Nitro.

The first plant projected was built on farming land in the Kanawha river valley in West Virginia, 18 miles west of Charleston, and the name given, Nitro, was typical of the operations to be carried on there. The detail of construction is immaterial, but the proportions may be judged from the cost, which is placed at \$45,000,000, and this includes the expense of building the works and the several thousand homes for workers, with the necessary structures for administration and welfare of the employees.

The site of Nitro was a number of farms in a river valley that had been under cultivation for years, and it lacked everything that was essential for a place of work or residence. Jan. 1 of this year the operations of constructing it were begun, and 10 months later it was a city of 17,000 people, with the shops and mills complete and productive, with 2000 or more residences, and besides these, roads, streets and sidewalks, water, gas and sewerage systems, lighting and telephone and telegraph circuits, and railroad

tracks and terminals, all built substantially and equal to what would be found in any community, though possibly lacking the finish that comes with occupancy and desire for surrounding ornamentation of homes.

Construction Is Permanent.

This was not a mushroom collection of shacks. The buildings were all permanent and were equipped with practically all the conveniences that could be found in any long established place of residence. While the big munition plant was built for the production of explosives for use in the war, the object is to have it always in readiness for operation so that, should there be later on need of producing ammunition material, it would be in readiness. For this reason the city of Nitro is well built and the character of materials used was the same that would be used for similar construction in any industrial community.

Construction Is Substantial.

For instance, all of the buildings for manufacturing are substantial, located as much removed from the residential section as is practical, with a view of minimizing the danger from accidental explosion, and the houses are four, five and six-room bungalows, with practically every facility and convenience that can be found in the homes of industrial workers constructed to general designs and not to meet the ideas of individuals. The residences are located with reference to permanent streets, and sanitation required water distribution and disposal of sewage. Convenience necessitated the installation of gas mains and the erection of electric light, telegraph and telephone circuits.

While the buildings as a rule are detached and separated as the needs of safety require, some of the structures of the works are very large. This applies especially to the power houses, which are equipped with engines to develop 47,000 horsepower.

The city is on a government reservation 18 miles west of Charleston, and is on a bottom land between a range of hills and the Kanawha river. The tract under government control is somewhat more than 3½ miles long and about 1½ miles wide, the river bounding one side



The Condition of This Truck and the Road Surface Evidence the Wisdom of Careful Loading and Systematic Cleaning and Inspection That Saved Loss of Service Time.



A Team of 10 Yoke of Oxen Used for Haulage—Another Evidence of the Conditions in Which Construction Was Rushed to Completion in Almost Unparalleled Time.

and the hills the other. The construction of the city was planned as quickly as the engineers believed would be possible, and conditions required that the work be begun in mid-winter—a winter that was the most severe of record in America.

Continuous Work Planned.

The preliminary work was the building of a railroad to the reservation, with spurs and sidings, and following this roads were constructed, which were developed and perfected according to the requirements of the work as it progressed. The working plan was proportionate to the project in the sense that all the equipment that could be used was available and the workers were numbered by thousands. Operations were carried on night and day, a part of the time practically continuously, and at all times at a pace that was only possible by the splendid cooperation of an organization that may be said to be the largest and the most efficient in the history of a concern known the world over for the success of its industrial operations.

While practically unlimited resources were at the command of the government and the contractor, the army of workmen contributed quite as much to the success of the operation as did the engineering, and the physical and climatic conditions that would ordinarily have been obstacles were not causes of retardation.

The material for the construction of the works and the dwellings and the various buildings necessary for the completed plant and the city of workers, as well as temporary structures and the underground and overhead systems, was brought to the reservation and first stored and next distributed to the places where they were used. This necessitated transportation in large volume and practically to every part of the reservation.

The Transportation Units Used.

Besides this haulage there was excavating seemingly without end, filling and grading. In a general way this had best be dealt with by statement showing the units, which included 50 power trucks, 650 teams of horses, 17 yoke of oxen, 30 small tractors of caterpillar type, which were used with trailers very frequently; six standard gauge locomotives, a number of narrow gauge locomotives, a river steamer, 11 barges and a derrick boat.

These units were assigned for work

that could be best done by them and the trucks were utilized for the work that required speed and large volume. Yardage and tonnage of compelling magnitude will afford some idea of the work done with the machines, but a true realization of what is stated in various terms and totals could not be possible unless one were to make a personal visit, and not even then unless one were informed of the original conditions.

The transformation was of lands on which crops were grown to the sites of workshops of varying types and dimensions; huge boiler houses, administration buildings, offices, barracks, magazines for explosives, a hospital, a railroad station and thousands of homes. And these are referred to as units when they in themselves each represent varying ratios of materials, often of large volume, handled and rehandled in the course of construction.

Some Items of Materials.

The following are some of the items of materials, but these do not fully represent the work of hauling and distributing them, for these were, in some instances, received and stored and requisitioned and delivered to places of construction, necessitating several handlings, and the excavating and filling it not even stated:

Brick	30,950,000
Concrete, cubic yards.....	185,000
Lumber, feet	75,079,000
Sewer pipe, four to 12 inch, lineal	

feet	199,160
Segment block, lineal feet.....	46,356
Cast iron water pipe, lineal feet.	343,200
Wooden water lines, lineal feet..	65,500
Plumbing fixtures	14,340
Valves	80,000

In addition the freighting included materials for more than 12 miles of macadamized roads, several thousand tons of machinery, household furniture for 2000 four, five and six-room bungalows; materials and equipment for 10 mess halls, seven stores, 22 stands and a large administration building.

Operating Speed Imperative.

That the work should go on without cessation there was necessity of all requirements being met. Speed was imperative and this meant that the haulage work must be highly systematized. The main contractor was the Thompson-Starratt Co., and the trucks were owned by the Heavy Haulage Co., New York City, of which George H. Pride is president. The Heavy Haulage Co. made contract with the main contractor to provide the trucks at a stated price a day, which included a repair shop equipment, a stock of spare parts for repairs, a competent master mechanic to operate the repair shop and a force of expert mechanics and an office manager and a superintendent of operations.

The Heavy Haulage Co. provided 35 two-ton truck chassis equipped with hydraulic hoists and two-yard steel bodies, five five-ton truck chassis with hydraulic hoists and three-yard steel bodies, and 10 two-ton truck chassis with platform bodies. All of these were Pierce-Arrow machines.

The Thompson-Starratt Co. hired the truck drivers and furnished the fuel, lubricants, supplies of all kinds for the trucks and provided the repair shop and office buildings necessary. One of the conditions of the contract was that the drivers should clean, oil and grease the trucks daily, this being done after the day's work had been completed.

Little Time Lost by Trucks.

The operating plan was proven by experience to be admirable. The time lost by the trucks from breakage or other cause was comparatively small, although the conditions were extremely difficult,



Under These Loading Bins There Was an Almost Continuous Stream of Trucks During the Working Hours, Showing the Value of Careful Preparation and Systematic Operation.

because the roads were merely paths for a considerable period, often obstructed with mud, and maximum power was often necessary to do work that would have been comparatively easy were the ways what might be regarded as fair for country sections. An idea of the lack of roads may be gained from the statement that at times a team of 10 yoke of oxen was used for extremely heavy work, this being probably as large a number of animals as is ever used for vehicle haulage.

The work was planned with reference to the requirements of each construction, the distribution being continuous, so that there should be always sufficient material for each work. There was one requirement—which was necessitated by the lack of roads—that the trucks should not be overloaded, and much care was taken to insure this order being observed. One result was that the trucks could always be worked with their power—there was no loss of time because of miring, despite the fact that the ground, when not frozen, was mud of varying depth, and when frozen careful driving was imperative because of the rough surface.

The ground was alluvial deposits and clay that when dry crumbled to powder, that when wet was slippery, and when saturated became a combination in which traction was difficult to obtain. This mud adhered to the wheels and vehicles to considerable depth. Accumulations of mud on each truck sufficiently increased the weight to add to the fuel and lubricant cost, and to facilitate adjustment and repair, as well as minimize this expense, the machines were washed each night, although this might appear to observers as needless, from the fact that the machines would be quickly mud covered when again used.

Machines Carefully Inspected.

The trucks were carefully inspected by the master mechanic and two assistants and whenever work was necessary it was done as quickly as possible, so that there was comparatively little lost time and practically all the trucks were available, there seldom being need of withdrawal from service for any protracted period. The inspection system was found to be the best insurance against excessive wear and maintenance expense, and the large stock of parts made renewal and repair delays a minimum.

The normal work day was 10 hours, but the machines were generally worked more than this, the engines rarely being stopped save for the lunch period of the day, and the hauls ranged from half mile to three-mile round trips. Some of the work done included the hauling of 500,000 bricks with eight trucks in six days, the haul being a half mile and the loading periods 12 minutes; the removal of five car loads of warehouse materials in 3½ hours with eight trucks, the round being four miles; the haulage of 300 tons of crushed stone with five five-ton trucks in nine hours, making three mile trips, loading and unloading being by gravity.

Quick Handling a Factor.

Wherever possible the loading was done from loading bins or pockets, and

the loads were discharged by gravity, but thousands of loads were handled manually. The work was planned to keep the trucks moving and there were crews large enough to do the freight handling in the shortest time that was possible. The transportation activity may be judged from the fact that from early in January until Oct. 12, 29,294 box freight cars were unloaded, and during the peak of the operation for a period of six weeks, no less than 200 cars were received each day. This meant that one car was received and unloaded every three minutes of the working day.

Another statement that may reflect the magnitude of the work and the speed of its progression was that up to Oct. 12, 3000 individual buildings had been erected, wired for electric lighting, the plumbing installed and furnishings delivered, or one completed for occupancy for every 30 minutes of a working day. This may be expressed as completing and furnishing 20 buildings a day.

Standardization of Material.

Such progress could not have been possible save by standardization of material. All of the lumber for the bungalows was cut to patterns at the mills and was fitted and ready for erection. So far as possible all of the material for the other buildings was prepared and was ready for erecting without further fitting. One of the largest works was hauling the materials for the water supply system, which has a capacity of 90,000,000 gallons of water daily, a quantity double what is used by the city of Baltimore. This very large requirement is from the fact that not only must all the houses be supplied, but a great deal of water is used in the boilers of the power houses, which develop 47,000 horsepower. In addition all of the electrical equipment for the lighting and power system of the plant, which has generators that produce 3000 kilowatts, was transported.

The details are innumerable, but what has been stated is sufficient to show some of the work done with the trucks, and though no statement is made concerning their economy, when this is measured by speed there is no question whatever that the saving was very large.

RISBERG CONTROLLER OF REPUBLIC INTERESTS.

The Republic Motor Truck Co., Alma, Mich., which is claimed to be the largest manufacturer of power trucks in the world, has appointed M. M. Risberg controller of the company and the company's subsidiaries, which include the Republic Motor Truck Co. of California, the M. & S. Corporation of Detroit and the Torsbensen Axle Co., Cleveland, O., and Mr. Risberg has named W. G. Ralph as his assistant.

R. F. Dyer has retired as assistant sales manager of the Aluminum Castings Co., Detroit, and has been succeeded by Arthur Birge, who was manager of the Ames Tool and Shovel Co., Anderson, Ind.

Government Is Urging Rural Express Delivery

For the purpose of encouraging the establishment of rival motor truck routes and regular motor truck service between cities and towns, the Federal Bureau of Markets has arranged to give its sanction to such truckmen as are proved to be worthy, and who desire to work more closely with the government in developing, stabilizing and standardizing this business. Operators who agree to work according to most approved practices and to conform to the general requirements of the Bureau of Markets are to be given the advantage of advice and information developed through the bureau investigations.

Large metal signs for display on trucks will be furnished to operators meeting the requirements. These signs will read, "The owner of this truck is cooperating with the Bureau of Markets, United States Department of Agriculture." The operator also will be privileged to use this sentence on his stationary and in advertising.

Requests for application blanks, to be used in obtaining the signs, should be made to the chief of the Bureau of Markets, United States Department of Agriculture, Washington, D. C.

Through its cooperation with motor truck operators the bureau hopes to make it easy to place in proper hands such advice and information as it may secure; to act as a medium for distribution of information among operators; to stabilize the rural motor business by requiring adherence to certain business practices, and to give to reliable operators the business advantage of working cooperatively with the Bureau of Markets.

Truck operators who desire to cooperate with the bureau must agree to maintain dependable service and schedules; charge just rates based on cost plus a reasonable profit; keep satisfactory records of operating costs and furnish certain of them to the bureau; use uniform bills of lading approved by bureau, and provide adequate insurance for shipments.

No attempt to exercise arbitrary authority or to insist on practices detrimental to proper and profitable conduct of motor truck routes will be made, says the announcement of the bureau.

SHUART JOINS DENBY TRUCK CO.

The executive staff of the Denby Motor Truck Co., Detroit, has been augmented by H. H. Shuart, who was manager of the Detroit Automobile Dealers' Association, but retired when that organization suspended its activities because of patriotic reasons.

The Michigan Drop Forge Co., Pontiac, Mich., declared a monthly dividend of 15 cents a share for October and an additional dividend of 10 cents a share on common stock.

SERVICE THAT EXPEDITES INDUSTRY

Transportation Largely Dependent Upon Organization That Will Insure Against Loss of Time, Economize Labor and Operating Cost

By Ralph S. Lane, President United Motors Service, Inc.

MOTOR trucks, road and farm tractors and in large part passenger automobiles, which were regarded as being a prime necessity in winning the world's war, are of even greater importance in the work that must now be undertaken, largely by America, to restore order from chaos, to establish peace conditions, to develop industry and commerce, to adjust business and to rehabilitate nations that have been reduced through the devastations of warfare and the necessity of participation in the gigantic struggle.

The reason of this need is obvious. The greatest degree of efficiency and economy must obtain. In winning the war expense was not counted. An objective sought was reached, no matter what the cost. Now that the war has been won, extreme economies must be practised, for all the nations will enter into competition for trade, and in this the country that can supply the largest part of the demand will be the most successful.

Probably no one factor is of more importance than the motor truck.

So important did the government deem the truck in its relation to the agriculturalist, for instance, that the Council of National Defense, through its Highways Transport Committee, completed a survey of rural motor express operations in Maryland to determine war time benefits to be derived by farmers, consumers of food products and the public generally, through this modern transportation development. This survey, which was preliminary to the rapid establishment and extension of facilities where needed, proved to the Highways Transport Committee that it is imperative rural express development extend its benefits to every producer of food stuffs throughout every rural area in this country. In Maryland new facilities were provided on the basis of actual need for the additional service.

Conservation Work Extended.

This work of survey and the adding of facilities where needed is now going forward under direction of the Highways Transport Committees of the several state Councils of Defense. And this because the truck has become an indispensable adjunct to the farm and ranch, not only in the form of the rural motor express, but also in the cases of thousands of farmers who maintain motor trucks for their individual use.

As for other uses of the motor truck, every one knows the adaption of motor trucks to relieve railroad congestion in our commercial districts saved the transportation situation at a most critical period in our country's history.

The relative importance of the motor truck in our national transportation



Ralph S. Lane, President, United Motors Service, Incorporated.

scheme is greater even than that of the passenger car.

Relation of Automobile to Transportation.

In the United States the passenger car holds a position in relation to the transportation problems of the country of far greater importance than in Europe. In our country 5,232,091 motor cars are in service; in all of Europe on Jan. 1, 1917, there were approximately only 437,558 motor cars and trucks. This difference is largely accounted for by the fact that the light, low priced passenger car is used so widely in the United States for commercial purposes.

In Europe the passenger car is not generally put to "business use" in the sense

in which we would apply that term. To the European farmer, salesman or small merchant it lacks the utilitarian aspect which it bears in the United States. How vastly important in a business way the passenger car is in this country is clearly revealed by comparing the registration figures of July 1, 1918, with those of Jan. 1, 1918. This registration shows a gain of 525,665 motor vehicles—a gain mainly made in the grain belt of the Mississippi valley and the South. The 15 states that led in registration gains are agricultural states, Ohio, California and Kansas heading the list, with Illinois, Missouri, Michigan, Nebraska, North Dakota, Oregon, South Dakota, Washington, Arkansas, Kentucky and Tennessee the other agricultural states showing gains in the order named. The farmer or rancher, who is naturally responsible for the bulk of this increase, uses the motor car for business. Transportation has always been his big problem—he is using the motor car to solve it.

Lesser Gains in Industrial States.

The reduced gains in motor vehicle registration in the manufacturing states make those in the agricultural state the more marked. New England, emphatically a manufacturing territory, shows a drop of 7106 registrations from July 1, 1917, to July 1, 1918, as compared with the like period preceding, and this is generally true of the manufacturing sections, where, of course, there is not nearly the same proportionate demand for the passenger car for commercial use as exists in the agricultural communities. In these communities the lack of a motor car is coming to be looked upon as evidence that the farmer is not producing to the utmost of his ability.

The business utility of the passenger car in the manufacturing sections is very large, however, and the motor car in such territory plays no small part in the speeding up of all sorts of industry. The falling off of motor car sales in these territories seems to present an irrefutable argument against the statement, which even now is some time heard, that the motor car is mainly a luxury, particularly as the decrease comes at a time when the purchase of essentials only is being



Two-Ton Federal Truck at the Sochelle Peach Farm, North Yakima, Wash., Loaded with Crated Peaches—An Instance Showing the Rapidly Increasing Use of Power for Agricultural Operations.



How the Truck Is Utilized for Rural Transportation: Two-Ton Federal Truck, Owned by R. N. Cunningham, Advance, Ind., Used for Hauling Cattle from Farms to the Union Stock Yards, Indianapolis, Ind. Since December, 1916, This Machine Has Been Driven More Than 30,000 Miles and Has Hauled More Than 1,500,000 Pounds of Live Stock.

stressed and acted upon generally by the people.

Magnitude of Service Organization.

In the United States, 76,859 garages, machine shops and supply houses are in operation, with their energies devoted to keeping in continuous service these necessary motor cars, motor trucks and tractors. Of these such organizations as the United Motor Service, Inc., are an enormous force for efficiency and economy that must of necessity have far reaching influence in the continuance and the development of business.

Efficiency and economy can only be obtained by clearly established policies, based on conditions and necessities, by system and organization and careful administration, which are represented to the largest degree in the companies that have been formed to operate on extremely large scale and have business connections country, if not world, wide in their scope. Considering a company of this type and magnitude it has specific application from this aspect:

The United Motors Service, Inc., for instance, directly represents in a service capacity three great producers of essential electrical equipment for automotive vehicles—the Dayton Engineering Laboratories Co., manufacturer of Delco starting, lighting and ignition systems; the Remy Electric Co., also manufacturer of starting, lighting and ignition systems, and the Klaxon Co., manufacturing warning signals and warning signal equipment.

And further, because the service given is essential to continuous and efficient operation of trucks and cars and tractors in this country, and it is of such a highly specialized nature that the ordinary garage cannot give what is comparable with it. In fact, our service generally reaches the motor truck and motor car owner through his garage.

As we understand it the object of every person today should be to conserve what exists and to create wherever this is practical; to economize from every aspect and produce more than ever before, to improve quality and to bring about the general recognition of this quality to the

end that there shall be larger demand and what may be regarded as a universal market.

From another viewpoint the general policy may be said to be standardization of service, of production or of operations of every character that can be carried on extensively, and which will through magnitude and volume of transactions become the dominating influence in industry and commerce. This means that there must be the greatest activity ever known, both commercially and industrially, for each nation will so strive for trade supremacy that it will test to the utmost the resources of all others. It will be a survival of the fittest—of that country and of that industry that shall be best prepared and which can meet the conditions with assurance and unity of purpose.

The Cleveland Galvanizing Works Co., Cleveland, O., has changed its name to the Chain Products Co., but has not changed its personnel or management.



How Quick Service Expedites Industry: This Buick Delivery Wagon, Used by the Fisher Body Corporation, Detroit, 12 Hours a Day, Having a Defective Ignition System, Was Driven to the Ont Doors Repair Floor of the United Motors Service Branch, Where a Quick Restoration Was Made and Practically No Time Was Lost.

METAL WHEEL MANUFACTURERS MEET AT DETROIT.

A meeting of the Automotive Metal Wheel association, an organization of manufacturers of metal wheels, recently held at Detroit, was attended by about 25 representatives of concerns holding membership. The principal object of the meeting was to discuss means whereby the members as an industry might further assist the government in the prosecution of the war, and among the subjects discussed was that of standardization.

The officers of the association are: R. H. West of the West Steel Casting Co., president; R. P. Flower of the Standard Steel Casting Co., vice president; W. E. Burns of the Michigan Malleable Iron Co., treasurer; G. L. Lavery of the West Steel Casting Co., secretary. The executive committee is composed of H. A. Coffin of the Detroit Pressed Steel Co., chairman of the built-up wheel division; R. D. Webster of the Wire Wheel Corporation, Buffalo, chairman of the wire wheel division, and George Walther of the Dayton Steel Casting Co., chairman of the cast wheel division.

GOVERNMENT ORDERS BODIES FOR MOTOR TRANSPORT.

A large government order has been accepted by the O. J. Beaudette Co., Pontiac, Mich., to build two types of bodies for trucks and a touring body for passenger car chassis and production will be begun shortly. The company is now obtaining lumber for the work and arranging the equipment of its plant.

DIETZEL GOES TO ROWELL.

After service for several years as superintendent of the Waukesha Motor Co., Waukesha, Wis., A. W. Dietzel retired to become works manager for the I. B. Rowell Co., Waukesha, a concern engaged in manufacturing farm implements, tractor parts and starters for Ford chassis.

COURT DECISIONS OF AUTO CASES

By J. Simpson.

The following summaries of recent court decisions relating to the use of automobile vehicles are of interest to all citizens, from the fact that they deal with conditions that might reasonably be paralleled in every day experience. Because millions of passenger cars and freight trucks are in use in America there is constantly increasing litigation and determinations that establish rights and interpret statutes in each of the different states. These summaries will be published at intervals. In briefest terms facts on which decisions are based are stated and the authorities are quoted, so that reference can be made for more extended presentation should this be necessary.

Written Agreement of Sale of Garage and Equipment—Parol Evidence.

A bill of sale of a garage and its equipment under seal, contained a covenant that the seller was the lawful owner of the goods and chattels sold, that they were free from all incumbrances, that he had a good right to sell them and that he warranted them against the lawful claims and demands of all persons.

In an action by the purchaser the plaintiff relied on an oral warranty that the articles constituting the equipment of the garage cost the defendant the amount set forth in the inventory.

There was no evidence of fraud and the plaintiff received all the merchandise mentioned. The trial judge ruled that the plaintiff could not recover and directed the jury to return a verdict for the defendant; the plaintiff excepted.

The Massachusetts Supreme Court, *Carpenter vs. Lugden*, 119 N. E. 959, overruled the exceptions, holding that as the contract of sale was in writing and contained the entire agreement of the par-

ties, it could not be contradicted by oral evidence that the defendant warranted that the price of the chattels sold was the price paid by him. While parol evidence is admissible to identify the subject matter to which a written contract relates, the evidence of the cost of the equipment was not offered for this purpose. It was offered to show an additional warranty not contained in the written bill of sale, and was therefore held inadmissible.

Suit for Repairs on Automobile.

Suit was brought in the Missouri courts to recover the value of material furnished and work performed by the plaintiff on the defendant's automobile. The defendant took the car, which was not in good running order, to the plaintiff, who was in the business of locating automobile troubles and in repairing cars.

The plaintiff undertook the work and agreed to put the car in running order. His bill was for \$275, upon which he was paid the sum of \$141.80, leaving a balance of \$133.20. The defendant pleaded a counter claim in two counts: First, that the plaintiff agreed to repair the automobile and put it in good running order and estimated the charge at \$40, which was paid, and that the defendant at the plaintiff's request advanced to him thereafter the further sum of \$100 on the repairs, but the plaintiff failed to repair the car and put it in good running order, and, therefore, the defendant asked judgment against the plaintiff for \$140; second, that the plaintiff agreed to repair the automobile and put it in good running order, but failed to do so, depriving the plaintiff of the use of the car for 35 days, and requiring the defendant to incur an expense for the repair of the automobile by others, all to his damage in the sum of \$350.

The case was apparently tried on the theory that the plaintiff had abandoned his counter claim and the jury returned a verdict for the plaintiff for \$105.05. On appeal it was held that the defendant could not then complain that his counter claim was ignored in the instructions given by the trial court, and judgment for the plaintiff was affirmed. *Toussier vs. Thayer* (Mo.), 204 S. W. 27.

Liens for Repairs—Rights of Partners.

In replevin to recover an automobile where the defendant claimed a lien for repairs, it was held that the defendant was not entitled to a judgment establishing a lien where it appeared that the defendant was a member of a partnership which had done the work, in the absence of a showing that the claim had been assigned to him. *Stoecker vs. Price S. & A. Co. vs. Erving* (Mo.), 204 S. W. 29.

Liens for Repairs.

The Oregon Supreme Court holds, *Pierce-Arrow Sales Co. vs. Irwin*, 169 Pac. 129, that where a repairer was given an automobile for a complete overhauling and the owner was permitted to use it before it was tested in the usual manner, and the owner returned it and requested more work to be done on it, the machine was not "delivered" under the Oregon state, L. O. L., section 7498, relating to time for filing notice of lien after delivery, until the work was completed.

Waiver of Lien for Repairs.

A garage which voluntarily surrenders possession of an automobile on which repair work has been done loses its lien securing payment of the amount due for repairs; and where the garage again comes into possession it cannot hold the car to protect itself against the nonpayment of such repair charges. *White vs. Texas Motor Car and Supply Co.*, Texas Court of Civil Appeals, 203 S. W. 441.

ANOTHER FORD TRACTOR PLANT NEAR ALBANY.

According to statement that has been widely circulated Henry Ford & Son, builder of Fordson tractors, has acquired an option to purchase Green Island, in the Hudson river, near Albany, N. Y., which is to be the site of a plant which will build tractors for distribution in the eastern section of the country and for export.

The statement is also made that work on the erection of the buildings will be begun about Jan. 1 and that eventually 15,000 persons will be employed. The fact that option has been taken is not confirmed as yet by the company. Incidentally one may point out that the company already has a main plant at Dearborn, Mich., has also purchased a site for another plant at Hamilton, O., and there are rumors that there are to be two or three others established in other parts of the country, as well as a possibility of another in Mexico if the proposition submitted to the Mexican government is approved. The Ford interests have also a plant at Cork, Ireland, which is said

to be known as the Trafford Engineering Co., which is expected to be given over to Ford cars.

LIGHTING SYSTEMS FOR FARM RESIDENCES.

The Litscher Lite Corporation has been organized at Grand Rapids, Mich., with Christopher J. Litscher president and treasurer, Fred N. Rowe vice president, W. Russell Patton secretary and sales manager, and these, with Charles J. Kindel and Elmer L. Kinsey, directors. The corporation has located a plant in a building once occupied by the Michigan Wheel Co. and has acquired a substantial interest in the Monarch Storage Battery Co. It will manufacture lighting systems adapted for farm residences, these being individual plants of differing capacities.

A. H. Doolittle, who was sales and advertising manager for the Zenith Car-buretor Co., Detroit, has resigned to associate himself with the publication division, service department of the Bureau of Aircraft at Detroit.

PACKARD COMPANY'S NET PROFITS \$5,616,701.87.

The net profits of the Packard Motor Car Co. and its subsidiaries for the year ending Aug. 31 of this year are stated in the annual report of the company to have been \$5,616,701.87. After payment of dividends amounting to \$560,000 on seven per cent. preferred stock, and \$710,382 on common stock, the profits, with a surplus of \$9,311,541.04, left a total surplus to the credit of the company of \$13,657,660.61.

The current assets, including inventories and materials at the plant at Detroit and branches, were \$36,494,581.11, and the current liabilities were \$13,930,423.78. Gross assets of \$52,879,084.65 is shown by the consolidated balance sheet. The total capital stock issued is \$19,656,930, and the company has outstanding \$8,000,000 seven per cent. preferred stock and \$11,813,430 common stock.

The Canadian Johns-Manville Co., Ltd., has been organized at Montreal with capital of \$2,500,000.

NEW POWER TRANSMISSION SYSTEM

Spur Master Gear of Differential Driven by Countershaft Actuated by Driving Shaft Pinion—Guy Back Axle a Simplified Type



The Guy Two-Ton Chassis, in Which the Power Plant and Transmission Gearset Are Mounted in a Sub-Frame Having Full Three-Point Suspension, and the Main Frame Has Unusual Flexibility.

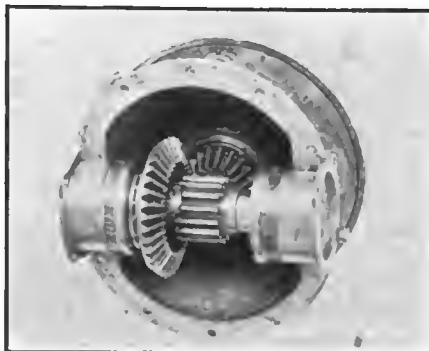
By Frank C. Perkins.

THE accompanying drawing and illustrations show the rear axle gearing and three-point suspension of a novel two-ton motor truck developed by Guy Motors, Ltd., at Fallings Park, Wolverhampton, England. These establish details of the chassis and the back axle, which can be dismantled without removing it from under the machine. The construction is such that with one front wheel resting on a hank two feet high there are no excessive chassis stresses, this being one of the practical results obtained by the sub-frame suspension, which is one of the special features of the design.

There is an extra high top gear in the transmission system gear box, for use when the vehicle is driven lightly loaded, which gives about 20 per cent. reduction in petrol consumption without any increase in speed. The construction of the back axle is such that all of the working parts may be removed without jacking the truck. Special attention has been paid to lubrication throughout the chassis, and the oiling of the engine, gear box, change speed, rear hubs and uni-

versal joints is entirely automatic.

It is claimed that this truck has great



The Housing of the Pinion Shaft and the Countershaft of the Main Driving System of the Guy Chassis.

flexibility, so that there is in effect an absorption of the shocks and vibratory stresses instead of destructive rigidity; that instead of resistance there is yield

wherever this can be practically obtained. This construction applies particularly to the installation of the engine and gear box in the main frame of the chassis.

Under Frame Suspension.

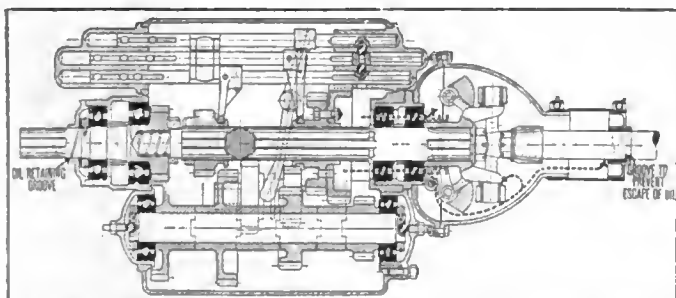
It may be noted that the engine and gear box are together carried upon a stout channel section underframe, and this underframe is in turn attached to the main frame at three points, one central point in the front by a ball and socket joint attached to a cross member, and again at the back where the ends of the underframe (which has a similar form to the letter U) are provided each with a ball joint attached to a short hanger free to swing fore and aft around a stout tubular cross member.

Attention is called to the fact that one often hears of special qualities being for so-called three-point suspensions, in which the unit to be suspended is merely bolted rigidly to the frame in three places instead of four, or provided with, perhaps, one joint having movement in one direction only, so that it is distinctly refreshing to meet with a design in which a very close approximation to an ideal three-point mounting is reached.

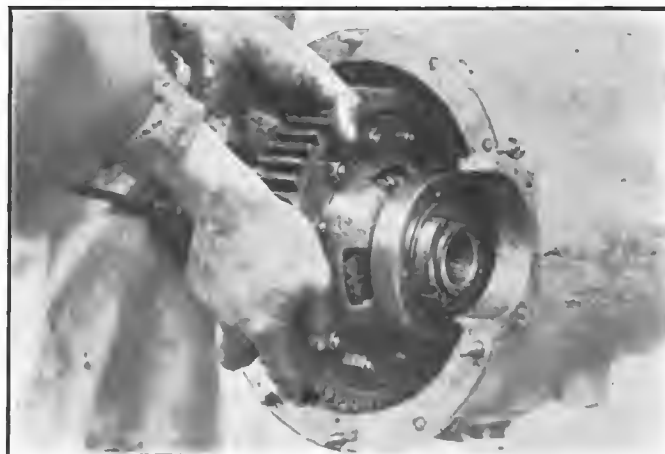
It is held that a rough definition of true three-point suspension may be given as a body supported at three points in such a way that the movement of any one point relative to the other will not exert additional stress in any direction upon the body. In this suspension, illustrated, if the front cross member be racked or twisted relative to the central tubular cross member, it is claimed that no stress is thrown upon the underframe, because whilst the ball joint at the front end permits the underframe to retain its original position, the ball joints at the back end will allow slight movement, and also the swinging attachment of the ball ended hangers to the cross tube will compensate lack of parallelism between that cross tube and the front cross member.

Engine of Small Capacity.

The motor of this truck has a power capacity of 15.9 horsepower, with a bore of 80 mm. and stroke of 3.1496 by 5.1181 inches. The cylinders are cast in pairs



Vertical Longitudinal Section of the Guy Transmission Gearset, Four-Speed Ratio Type, Showing the Forward Universal Joint of the Main Driving Shaft.



The Center Section of the Back Axle of the Guy Chassis, Showing the Differential Gear Being Removed and the Seats for the Countershaft of the Driving System.

with the valves on the near side, the valve stems and springs being enclosed by detachable covers. The carburetor, which in this case is a Zenith, is located on the right side, and ports are provided between the individual cylinders of each pair, through which the mixture is supplied to the inlet valves from the separate inlet pipe.

It may be stated that the magneto is installed near the front of the engine on the near side, and the shaft by which it is driven by a leather coupling is extended in front of the crank case to drive a water pump. The cooling of the engine is affected by a tubular radiator with detachable cast aluminum tank top and bottom. This radiator is mounted in trunnions. A bracket on the front of the crank case carries in ball bearings a four-bladed fan of high efficiency. The lubrication of the engine is by the White and Poppe system.

Attention is drawn to the manner in which the teeth of the gears of the transmission gearset mesh. It is not claimed that the idea is new, but it is not generally known and adopted. In the sliding gears on the sides of the gears where engagement takes place the teeth are beveled off from a distance of four mm. Thus if the teeth are pushed into mesh until the faces of the gears are parallel, the beveled surface of four mm. on one side of one gear and of four mm. on the opposite side of the other gear, or a total of eight mm. of the toothed faces in all will be inoperative. In the Guy gear box, illustrated, however, the gears are arranged so that the teeth when meshed continue through on to the far side, causing the face of one gear to be out of line with the face of the other gear to the extent of four mm., with the result that only four mm. of operative gear face are lost instead of eight mm. The layshaft, by the way, has a hardened steel ball let into the center of each end, against which adjustable registering points bear so that the depth of mesh can be adjusted.

WAR TAX DECISIONS ON POWER VEHICLES.

The following statements are the official construction of the war taxes as applied to power vehicles and equipment, as established by Deputy Commissioner B. C. Kelth of the Treasury Department, Washington, at the request of the National Automobile Dealers' Association.

That automobile bodies, side cars for motorcycles, speedometers and other attachments and accessories to automobiles and motorcycles, are not taxable when sold separately, but they are when sold as part of an automobile or motorcycle or its equipment, whether standard or not.

That where any person other than a manufacturer of the chassis completes and sells an automobile, the tax must be paid on the complete car, less any tax already paid on the sale of the chassis.

That where a dealer, in order to reimburse himself for the tax paid by him to the manufacturer of a chassis, adds the exact amount of the tax to his invoice as a separate item, stating it to be the war tax, such amount may be excluded in determining the price for which the article is sold. But where the price of an article is increased to cover the war tax, the tax is upon the increased price. Or, if the dealer adds any different amount than the actual tax paid, no matter in what way or with what explanation, the tax must be calculated upon the dealer's total bill.

With regard to the inclusion of freight charges in the price upon which the tax is to be computed, that where the freight charges to a point of delivery are paid by the dealer, such freight charges, if billed as a separate item to cover freight, need not be included in the amount upon which the tax is to be computed. However, as in the case of reimbursement of tax paid, if the price of the article is increased to cover freight charges, the tax is upon the increased price.

Where a dealer purchases a truck from the manufacturer for \$1000, adds a body

costing \$400, and sells the complete car for \$1900, plus \$70 freight charges, plus \$30 war tax, or \$2000 in all, the tax is three per cent. of \$2000, or \$60, less the \$30 already paid to the manufacturer upon the sale of the truck, making \$30 tax. On the other hand, if the \$70 freight charges and the \$30 war tax are billed as separate items, they need not be included in the amount upon which the tax is to be computed. The tax would then be three per cent. of \$1900, or \$57, less \$30 tax already paid on the original truck, making \$27 tax due upon the sale by the dealer of the completed machine.

BOARD OF COMMERCE APPROVES TRUCK TRANSPORT.

The Board of Commerce of Bay City, Mich., has undertaken to promote highway transportation between that city and other cities in a very practical way. There is no doubt that with the substantial promotion afforded the services will be developed substantially. Public services are now operated between Bay City and Saginaw, Flint, Holly, Pontiac, Owosso, Lansing, Battle Creek, Midland, Alma and places between these terminals, and freight is delivered in one day from Bay City to Flint and from Bay City to Detroit in 24 hours. The saving of time has been a marked advantage to business men.

SELDEN COMPANY ELECTS OFFICERS.

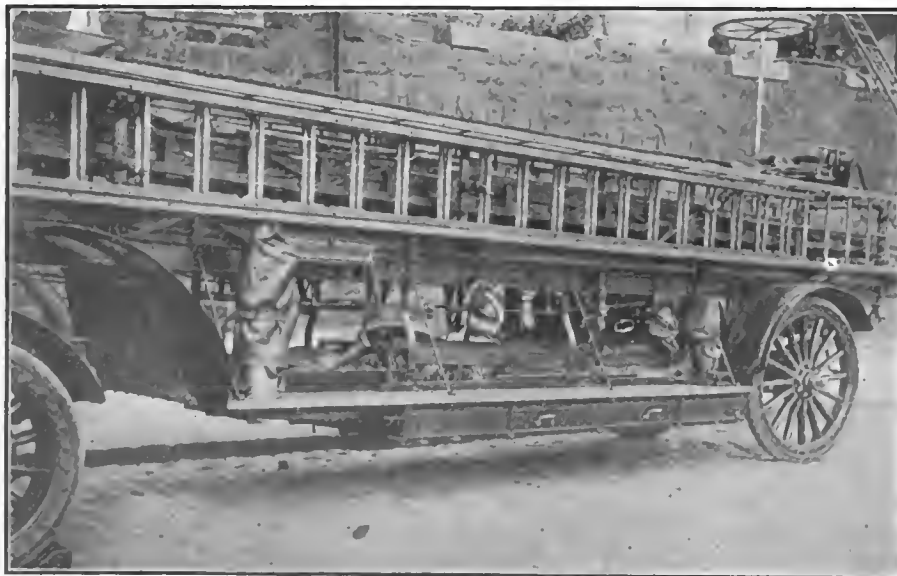
At the annual meeting of the stockholders of the Selden Truck Sales Co., held at the general offices of the company at Rochester, N. Y., the following directors were elected: George C. Gordon, William C. Barry, R. H. Salmons, Hal T. Boulden, W. F. Reynolds, E. B. Osborn, F. J. Kolb, H. G. Strong and C. H. Stearns. The reports submitted showed that the company has had a very prosperous year's business and that it has established representation in all principal commercial centers in this country and abroad.

The directors elected the following officers: President, George C. Gordon; vice presidents, William C. Barry, R. H. Salmons, Hal T. Boulden and W. F. Reynolds; secretary, E. B. Osborn; treasurer, F. J. Kolb.

NOVEL LIFE NET CARRIER FOR FIRE DEPARTMENT TRUCK.

The San Francisco fire department has motorized all hook-and-ladder apparatus and in doing so has equipped the trucks that carry the life nets with a specially constructed box which is supported under the body of the truck.

In this box the life net is carried flat and is so arranged that it can be removed from the carrying box very quickly. The box is fastened directly under the platform on which the firemen stand. The placing of the life net out of the way in this manner gives the truck a neater appearance, and gives more room for the firemen on the platform.



Ladder Truck of the San Francisco Fire Department Fitted with a Life Net Carrier Extending Across the Body Between the Running Boards, Where It Is Instantly Available When Needed.

Motor Apparatus for Street Cleaning Operations



Rear View of Flusher Used by the Street Cleaning Department of San Francisco, Showing the Steel Guard Installed to Protect the Operator of the Flushing Control.

Municipalities the nation over have accepted generally the utility of power driven apparatus for varying departmental work, and while many manufacturers produce machines designed for what may be termed standard service, numerous municipal administrative bodies have approved the ideas of departmental heads and permitted them to add to standard equipment fittings that are based on knowledge of conditions and seemingly have much to recommend them. By this is meant that practical men have good ideas relative to their own work, and these may be adapted to machines of all types in similar service, although the adaptations may differ somewhat.

The street cleaning department of the department of public works of San Francisco, Cal., uses several power driven tank flushers of a type that require crews of two men, one to drive and the other to operate the flusher control at the rear end of the machines. The separate control was preferred because there was belief that in heavy traffic the driver could not do the flushing as satisfactorily with a machine that diverted his attention from driving to avoiding vehicles and pedestrians.

These apparatuses have seats at the rear, where the valves are regulated by the operators, but very brief experience established that there was constant danger for them, for reckless drivers frequently approached too closely and had no thought of the possibility of injury of the men at the rear of the tanks. To protect the operators heavy steel guards were attached to the main frames of the chassis, sufficiently removed from the seats to safeguard the men in the event of collision, whether approach is from the side or the rear.

The efficiency of the department has been greatly increased by the use of flushers, for these machines can flush

from 15 to 20 miles of paved street a day, or at least 100 miles a week. The work is exceedingly well done. The flushers are worked with Eductor cesspool cleaners, which are used for removing the contents of cesspools and sewer catch

ACME TRUCK MAKES UNUSUAL LONG HAUL RECORD.

Drayer & Co., 26-28 Attorney street, New York City, recently completed a haulage job of special interest to truck owners and drivers for several reasons.

This work consisted of hauling approximately 113 tons of paper from New York to Washington, a distance of 225 miles one way, or a round trip of 450 miles. By carrying 4½ tons to a load, Drayer & Co. completed the job in 25 round trips. The running distance on this job was in excess of 11,250 miles, and the average consumption of gasoline was nine miles to the gallon.

It is also worthy of note that in this entire haul there was no service expense and no stops from start to finish, except those necessary for gasoline, oil, etc., and for loading and unloading. The truck used was a 3½-ton Acme.

FOREIGN TRADE RECORD SHOWS LARGE INCREASE.

The summary of the foreign trade for September, announced by the Department of Commerce, shows that new records were reached, this applying both to imports and exports. The imports for the month totaled \$262,000,000, which was an increase of about \$26,000,000 as compared with September, 1917, and the exports were valued at \$550,000,000, an excess of \$288,000,000 over imports, and an increase of about \$100,000,000 over the same month of last year.

R. C. Kimball, district manager, is in charge of the office established in the David Whitney building, Detroit, by the Lakewood Engineering Co., of Cleveland, O., as factory transportation expert.

Henry Ford & Son, Dearborn, Mich., is now producing an average of 170 Fordson tractors a day, this being a weekly total of 1020.

W-M-B MACHINE COMPANY A NEW DETROIT CONCERN.

Robert Wide of the Michigan Gear and Engineering Co., Wakefield R. Meade of the Northway Motor and Manufacturing Co. and William F. Beach, all of Detroit, have formed the W-M-B Machine Co., with capital of \$15,000, and have begun general operations in that city.



Eductor Equipment on a Kelly-Springfield Chassis, Used with the Flushers, for Cleaning Cesspools and Sewer Catch Basins by the San Francisco Street Cleaning Department.

PONTIAC TRACTOR A SIMPLE TYPE

Engine a Single Cylinder with Open Base Incorporated with the Frame, and Drive Is by a Chain and One Wheel—Construction is Unique

SIMPLICITY is the main object sought by the engineer who designed the farm tractor built by the Pontiac Tractor Co., Pontiac, Mich., for the construction has fewer parts, in all probability, than any other machine thus far produced by the industry. The tractor is maintained by the company to have been amply proven. It was developed by experimentation covering several years. N. A. Wright is president of the company and its engineer, and after he had built several machines and had successfully improved each to meet with needs established by experience and service, a design was perfected.

This machine was, according to the

tractor units, the principal one being the construction of steel frame engines, which is exclusive with this concern.

Built for All-Around Work.

The company broadly claims that its tractor is suited for all-around farm work, plowing, harrowing, discing, cultivating, threshing, hauling and supplying power for belt machinery, its utility being limited only by the power production of the machine. The working capacity is stated as three 14-inch bottom plows on any land surface, and the company maintains that it is particularly adapted for operating on slopes and soft surface, or on marshy fields, because the ground pressure is approximately five

practical for the average farmer. Incidentally the builders have had long experience in gas engine and tractor designing and construction and kept to basic mechanical principles and what has been established by sound engineering.

Tractor a Four-Wheel Type.

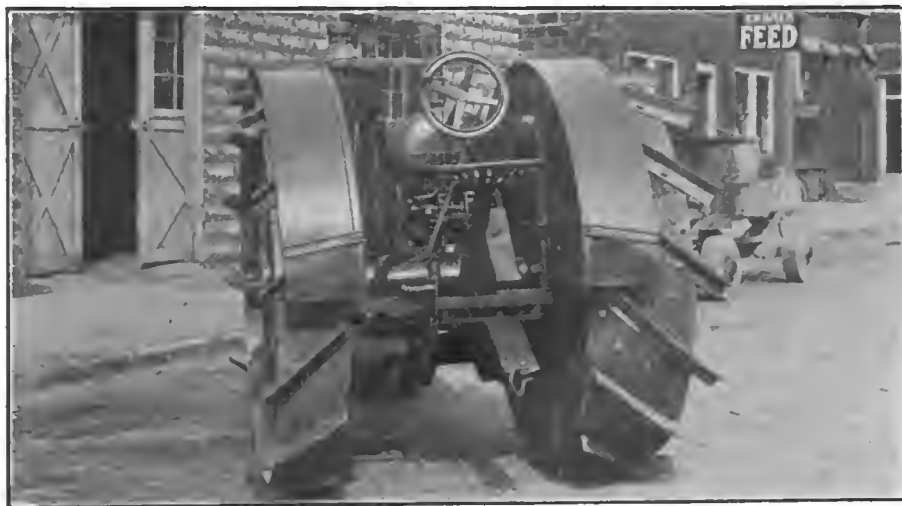
The tractor is a four-wheel type, that is driven by one rear wheel. The power is transmitted from the engine to the jackshaft by chain, and the drive from the jackshaft to the wheel is by a bull pinion and a sectional bull gear. From this statement one will understand that the transmission system is extremely simplified, yet the results have proven that it is practical and efficient. There is no differential gearset and no transmission gearset, the variability of engine speed serving instead of the usual changes of gear ratios, and in place of the differential gearset one wheel, clutched or locked to the rear axle for forward or backward movement, is disengaged, and the driving wheel will continue to turn and pivot the tractor on the free wheel.

The power plant is a very unusual construction, it being a single cylinder horizontal, four-cycle, water cooled type, which has a steel rod open base instead of the customary cast housing or crank case, and this base is combined with the main frame of the tractor so that the engine and frame become practically a unit. The tractor frame and the engine base are formed from one piece of 15-inch structural steel channel. This is claimed to take the place of from 20 to 50 parts and while light it is exceedingly strong. There are no riveted joints to loosen.

Engine Has High Power.

The engine is nine inches bore and 12 inches stroke and develops 32.40 horsepower, according to the S. A. E. formula at 1000 feet of piston travel a minute, which would correspond to 500 revolutions. The speed, however, is variable from 200 to 600 revolutions a minute. The company claims that the engine is so perfectly balanced that as high piston speeds are practical as are developed with multiple cylinder engines of the same rating; that previously to the invention of the Pontiac engine design large single cylinder engines were impracticable because of excessive weight, but with the Pontiac engine from 1200 to 1800 pounds of weight are saved on the engine alone, the stresses are more evenly distributed, more safely provided for, and there is a very large degree of simplicity and accessibility.

The company further claims that the single cylinder engine is the most successful for use with kerosene fuel, as in no other type can the exposed cylinder wall be reduced to a minimum. The engine is cooled by an evaporative system (hopper jacket) which obviates the use of pump, fan, radiator and pipe connections of all kinds, while it insures the high temperature of cylinder wall neces-



Rear View of the Pontiac Tractor, Showing the Width of the Right Wheel That Drives It—Simplicity and Economy Are the Claims of the Builder.

company, designed with a full knowledge of the requirement of power for farm work, and to have practically every quality that would add to its utilitarian value. The object was to construct what could be sold for a comparatively low price, could be used for widely varying work, could be worked for very small expense, would have long service life, would have endurance and because of its mechanical simplicity, could be maintained and adjusted and repaired for minimum cost, and by those not mechanically expert.

The company was organized about two years ago and a plant acquired and equipped with machine and tool facilities. Production has increased until now the output is more than one machine a day and if the manufacturing plans are carried out approximately 1000 machines will be turned out in 1919. The policy of the company is to standardize on one design and a single type and size. The company owns several patents on

pounds to the square inch of contacting wheel area.

As to the economy of the machine, an instance is quoted of a farmer at Milan, Mich., who has owned a tractor for two years, and the present season he has plowed, disced and harrowed more than 260 acres. In addition he has done considerable belt work and the total cost of maintenance for the year has been less than \$10. A Pontiac tractor owned by the city of Pontiac is used by the street department of that municipality for haulage, construction, grading, etc., and it has given excellent service at very small expense.

Probably one of the reasons for the satisfaction obtained with these tractors is the fact that from the simplicity of construction and accessibility of all units and parts it can be operated and kept in good mechanical condition by a man of average intelligence who is not mechanically trained. Claim is made that thorough knowledge of the tractor is

sary to obtain effective combustion.

The Lubrication and Cooling.

The engine is lubricated by a simple type of force feed, the oil passing through a sight gauge, and all bearings are lubricated with large grease cups. All the engine bearings are large, are lined with babbitt metal, and all are adjustable to compensate for wear. The engine is governed by a governor that is claimed to be extremely dependable and to allow very slight variation of speed. The ignition system is a vibrating jump spark type, the source of current being dry cells or a storage battery, either of which are economical and afford good results. The carburetor is built by the company to its own design and is said to be highly efficient. The air intake to the carburetor is carried high above the machine, so that it will be supplied with pure, clean air. This obviates the use of an air cleaner.

The Power Transmission System.

From the engine the power is transmitted to the jackshaft by steel sprocket wheels and a high grade roller chain,

and the jackshaft at the right end carries a bull pinion that meshes with the internal sectional bull gear of the right or drive wheel. The bull gear is bolted to the rim of the wheel and there is no variable stresses upon the spokes or the hub. The bull gear is die chill cast steel, in sections, is inexpensive and can be easily renewed when worn. This gear and the bull pinion are completely housed and are constantly lubricated, so the wear should be negligible even in hardest service.

The tractor is reversed by the movement of a hand lever that withdraws the bull pinion from mesh with the bull gear and meshes a reverse pinion that is idle and disconnected when not in use. The frame is underslung from the rear axle and this considerably lowers the center of gravity. The rear wheels are 60 inches diameter, the right wheel having 16 inches face and the left wheel 10 inches face, and for forward or backward movement the wheels are rigidly fixed on the shaft.

This insures that all the power of the

engine is being delivered to the axle and to the wheels. The tractor is so designed that one-half the weight is carried by the right driver, bringing the draft on the right side, giving wide furrow clearance and obviating breaking down the furrow bank while plowing. Claim is made that the rigidly connected wheels will add 30 per cent. to the efficiency of the tractor when working in wet or slippery soil.

The front wheels are a castor type, 28 inches diameter with eight-inch rims, and these are turned by an automobile type steering gear, a worm and sector construction, that is irreversible.

The tractor can be worked in very limited spaces because of the short turns that can be made, as the left wheel can be instantly disengaged by the movement of a hand lever. All the control members are grouped at the rear end of the tractor frame, with a spring-mounted seat for the driver, between the shields and guards that partly cover the rear wheels. The drawbar is a single piece, that may be swinging or rigid, that has 15 inches clearance.

ESSENTIALS OF TRACTOR SELLING

By J. A. Everson, Tractor Sales Manager, International Harvester Co. of America.

A STUDY of the qualities which the tractor salesman exercises during the process of getting the order reveals a certain skill, a more or less technical knowledge which he did not require nor frequently use as an implement salesman.

Because the implement salesman, more easily and with less readjustment of point of view, can adapt himself to the sale of tractors, it is probably true that his class is the chief source for recruits to the tractor sales army. He already knows the farmer psychology. He has a distinct conception of the farm atmosphere. He is entirely at home in any discussion about related subjects which bob up during the progress of a sale; in fact, he is well qualified in the very beginning to get into the friendly confidence of the farmer in substantial measure.

But in the sale of implements today he depends for success chiefly upon his ability to present convincingly these three essentials, which count most heavily in the prospect's mind—quality, convenience and the service behind the name. Formerly he preceded such arguments by winning the farmer to feel the necessity of the implement. That is no longer an important step in the sale, because the prospect long ago was sold on the need of having a well assorted standard implement equipment, and consequently does not react favorably to repetition of those fundamentals which he knows already almost as well as he knows his own name. So until the advent of the tractor the salesman to the farmer was permitting these fundamentals to get away from him. He was staking his reputation upon quality, convenience and service.

But since the tractor has grown to be

such a mighty factor in farming operations, the salesman realized he would have to resurrect the fundamental reasons of necessity if he were to be successful in selling tractors. He would have to draw generously on his entire experience, bringing half forgotten facts up to date, and revamping them to fit the tractor's case. In other words, he now found it absolutely necessary, generally first to bring to bear upon his prospect well supported reasons why a tractor would pay on his farm. He also found he would have to do this before he could expect a hearing on the merits of his particular tractor.

Truly, farmers hear much regarding the profitable and other practical benefits of the tractor, and very likely in a large percentage of cases they are persuaded the whole tractor proposition may be good, but as individuals are not sold on the tractor idea as being the necessarily ideal solution of their own particular problems. Because a neighbor has bought a tractor is seldom the balancing argument. So it is at this point that the tractor salesman has the opportunity to bring into play his reasons of necessity, and give vent to the ripe experience within.

The successful tractor salesman has studied diligently to bring his implement experience into concrete expression, to acquire more accuracy in his statements, and a more definite application of facts and figures to each prospect's problems. Therefore, he is prepared to figure out the money value of the tractor—the number of horses it will displace, the value of the feed and pasture thus released, the value of crops that can be raised on those acres and just what part of these savings

will be required to keep the tractor going. This knowledge must be exact and sound that he may hold his own on the farmer's own ground. He presents his reasons of necessity in terms of the prospect's own horses, acres, crops and conditions. In doing so successfully he is traveling in fields strange to the ordinary implement salesman.

But as soon as he has won over the farmer on the necessity of the tractor the salesman reverts to his three cohorts—quality, convenience and service, in order to win a decision for his tractor. From this stage he is back on old familiar ground and can present these three big reasons in their most attractive and persuasive form.

The tractor salesman of today then seems to be broadly developed and to need and use a wonderful capacity for imparting information. He is alive to every issue, posted on every branch of farm administration, crops, live stock, understands the normal operation of every piece of farm equipment and its adaptability, good or poor, to tractor power. He is a past master on the 101 kinds of tractor hitches. He knows the farmer and his ways. He knows the quality, convenience and service arguments for his tractor. All of these he uses expertly as the occasion demands.

HOENTHAL NOW MANAGER AT DETROIT.

The Eisemann Magneto Co. has appointed Elmer H. Hohenthal, who was formerly connected with Bosch Magneto and the Simms Magneto Co., manager of its sales and service branch at Detroit.



"Close-Up" of Equipment of a Truck Fitted with Centrifugal Water Pump and Air Compressor for Operating Pneumatic Tools, Specially Designed for the Bureau of Water Works, Los Angeles, Cal. At the Left of the Compressor Radiator Is the Flanged Elbow of the Water Pump Intake, as Positioned When Not in Use; at the Left of the Centrifugal Pump Is the Small Air Pump and the Hose Connection with the Main Air Tank.

Combination Water Works Pumping Apparatus

An apparatus that is very unusual in design, and is said to be the only one of the kind in the United States, has been constructed for the use of the Bureau of Water Works of the city of Los Angeles, Cal. Los Angeles has one of the largest and most expensive water distributing systems of the nation, the water being brought a long distance from a mountain range through a very large aqueduct. The city itself covers an area much greater than any other city of similar population and the system was constructed with a view of meeting the requirements of rapid growth for a considerable period of years.

The water distributing system requires much more maintenance work than would be necessary in a city of smaller area. To expedite both construction and repairing a truck chassis was equipped with a large centrifugal pump for pumpage of any kind, and an air compressor for operating pneumatic tools and obtaining air pressure wherever this could be utilized in the work. The two accompanying illustrations show the chassis and its equipment, and the pump and compressor installed so that the detail can be distinctly seen.

The chassis is fitted with a double power transmission system, the one for driving the truck and the other for driving the pump and the air compressor. The double system is controlled by the two levers seen just below the side of the driver's seat. Many novel ideas are incorporated in the installation of the pump and the compressor. A speedometer from an automobile has been utilized to determine the speed of the compressor. The compressor has an independent cooling system in which is included a radiator removed from a Ford chassis, and the fan for this radiator is driven by a belt off the flywheel of the compressor.

At the rear of the chassis can be seen the storage tank for the compressor system, and connected with this tank is a small air pump that is used to prime the main pump with water.

The illustration of the detail of the equipment shows the radiator of the compressor cooling system, the flanged elbow of the main pump and its position when not in use. This also shows the small air pump at the left of the centrifugal pump and the hose connection between the tank and the air pump. One of the uses for the air compressor is to drive pneumatic drills for cutting asphalt and cement paving bases. Statement is made that the equipment has been proven very serviceable and economical, and the combination has fully justified the ideas of the engineer who conceived it.

The Edmunds & Jones Corporation, Detroit, manufacturer of lamps and brass specialties, has been authorized to make a one-story addition to its plant.



Combination Water and Air Pump Equipment of the Los Angeles Bureau of Water Works with Outfit for Cutting Asphalt and Cutting Concrete Bases Connected to the Main Air Supply and in Readiness for Work. This Machine is Said to Be the Only One of the Kind in the World.

AFTER-THE-WAR NEEDS OF RUBBER INDUSTRY.

After-the-war needs are being discussed and determined so far as is possible by differing industrial interests, and because of the prominence of Col. Samuel P. Colt, president of the United States Rubber Co., his views with reference to the rubber industry are deserving of careful thought. In summary his opinion is that the rubber industry will be no exception to the other industries engaged in production of important commodities after the war. There must be marked recession in the prices paid for labor and material commodities like cotton. The stimulation of high prices brings into the field of competition after the war a number of smaller competitors whose business may not be as well founded as will be necessary to stand the shock of peace. All manufacturers will need ample reserves against recession of value in raw materials and finished goods on hand, and these reserves must be set aside during the war to avoid disaster.

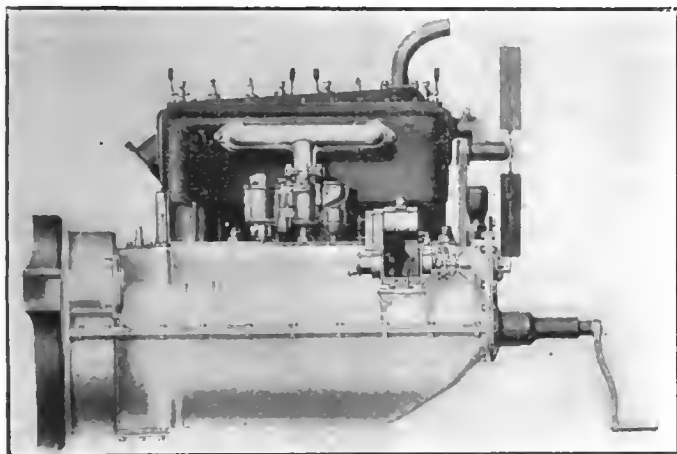
CONTINENTAL MOTORS HAS YEAR'S ORDERS.

The Continental Motors Corporation, Detroit, has just paid to holders of common stock a dividend of $1\frac{1}{2}$ per cent, this making a total of six per cent. paid on common stock during the calendar year. Secretary W. R. Angell, advising the stockholders of the dividend, stated that the business of the company was very satisfactory, and that the orders ahead insured the operation of the Detroit and Muskegon plants until late in the autumn of next year.

The Nelson Bronze Co., Saginaw, Mich., has appointed Charles M. Smith, who was formerly connected with the Detroit Steel Castings Co., and the Michigan Steel Casting Co., superintendent of its foundry.

WISCONSIN TYPE UU AND TU ENGINES

Specially Designed for Tractor Service, With Four Main Bearings and Proven Systems for Cooling and Lubrication, Is Highly Efficient.



Intake Side of the Type UU Wisconsin Tractor Engine, with Carburetor, Magneto and Fan Installed.

FIFTEEN engine models are built by the Wisconsin Motor Manufacturing Co., Milwaukee, Wis., of which seven are designed for combination with clutches and transmission gearsets as unit power plants, and are designated by the letter U following the alphabetical designation, and the other eight are intended for installation independent of the gearsets. These engines are both four and six cylinder, 11 of the former and four of the latter, and there is a wide variability of power. Taking the engines in order of the alphabetic designation the types, horsepower rating and cylinder dimensions are:

Model	H.P.R.	No. Cyl.	Cyl. Bore	Stroke
A	36.1	4	4%	5%
AU	36.1	4	4%	5%
C	22.5	4	3%	5
CU	22.5	4	3%	5
E	44.2	4	5%	7
EU	25.6	4	4	5
G	54.1	6	4%	5%
JAU	42	4	5%	6
JU	41.6	4	5.10	5%
K	66.3	6	5%	7
L	62.4	6	5.10	5%
F	79.5	6	5%	7
TU	25.6	4	4	6
UU	28.9	4%	4%	6

Wisconsin engines, despite the considerable number of models or types, are constructed practically to one design, there being variability of dimensions, and number of cylinders as specified above. The company has built engines for a long period and engineering and service experience have gradually concentrated its practise until what may be regarded as a general design is applicable to all its machines. And the same influences have also concentrated its manufacturing processes, so that a single statement of design and of production would apply equally well to all, al-

though there might be variance as to power capacity and dimensions.

For these reasons as well one can understand that Wisconsin engines represent a very high degree of development from the viewpoint of the company's engineers. The engines were originally intended for vehicle propulsion, but they have been used for power yachts with equal satisfaction, and utilization for farm tractors was logical

enough. Wisconsin engines might be regarded as standardization of design, which, while it means simplification of engineering and manufacturing, also insures an extremely uniform product.

This description will apply specifically to models TU and UU, which are differentiated by a slight difference in cylinder bore, the TU having bore of four inches and the UU 4% inches, but both with stroke of six inches. But the manufacturing facts will be identical with each and with all other engines built. The TU engine is rated at 25.6 horsepower by the S. A. E. formula and the UU engine 28.9 horsepower, and the former is the lighter by 10 pounds and weighs 590 pounds. Statement is made by the company that these have been especially developed for tractor service and are built for heavy duty.

Details of the UU Type Engine.

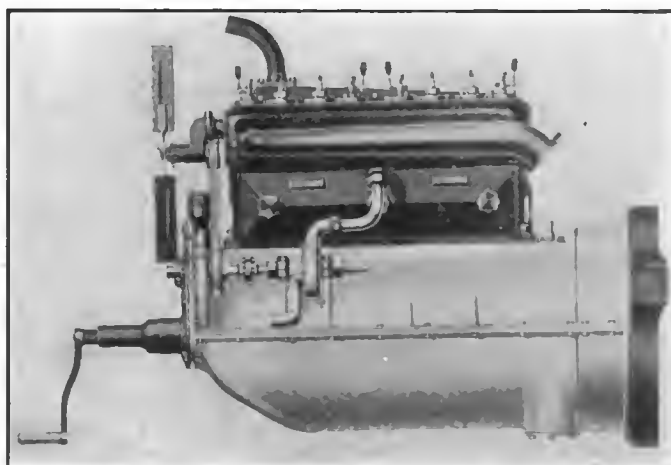
The description that follows is of the UU engine: It is a four-cylinder, four-cycle, L head, vertical, water cooled type, with the cylinders cast en bloc with the valves at the left side. The cylinder block is cast from a fine grade of close grain gray iron with the water jacket integral, the block above the cylinder heads being open. The cylinder heads are reinforced by cross ribs. The construction is such that the water passages are large and so forced and

cleared that there will be free circulation of water and very efficient cooling. The valve passages are entirely water jacketed and the water inlet is directly under the exhaust valves, this insuring the lowest practical temperature of the exhaust valves. The cylinder block is formed with heavy base flanges and with end webs under the valve pockets that serve as a seat for the cover plate that encloses the valve mechanism. The head of the water jacket is a brass plate that has a longitudinal channel increasing in depth from rear to front, the outlet manifold being at the forward end. This plate is retained by a series of screws.

The castings are cleaned and pickled and are then rough bored and reamed. After annealing they are ground to size and are finally tested by water pressure to insure against leaks or other imperfections. The pistons are made of the same quality metal and are pickled before machining. The units are turned carefully and are tapered slightly, the top being 3/1000 inch smaller to allow for expansion. The wristpin bosses are webbed to obtain extreme strength. Each piston is cut with three ring grooves and four oil grooves. The rings are semi-steel and are ground on the faces and edges to accurately fit the grooves. There is a wide oil recess in line with the wristpin that collects the oil from the cylinder wall and leads it to the wristpin bearing.

Two Section Crankcase.

The crankcase is cast in two sections from a special aluminum alloy, each section being cross ribbed. The upper section is divided transversely by three vertical webs that carry the three center main bearings of the crankshaft. At either end of the casting is a breather pipe. The lower section is the base of the crank chamber and contains the oil reservoir. There are forward and rear extensions of each section, the former housing the timing gearset and the latter the flywheel, the clutch housing and transmission gearset case being bolted



Valve Side of the Type UU Wisconsin Tractor Engine, the Water Pump and Fan Drive Being Clearly Shown.

to the bell. The lower section has a drain plug for cleaning the oil reservoir.

The crankshaft is drop forged from chrome nickel steel, heat treated to have a tensile strength of 120,000 pounds to the square inch, that is made with the flywheel flange, and a flange at either side of the rear journal to take end thrust, forged integral with it. The shaft is carefully machined and ground accurately. It is a four journal type, with the journals and crankpins two inches diameter, and the journals from front to rear are $2\frac{1}{2}$, $2\frac{1}{2}$, $2\frac{1}{2}$ and $3\frac{1}{2}$ inches length, a total length of 11 inches. The crankpins are three inches long.

Camshaft, Gearset and Bearings.

The camshaft is drop forged from carbon steel with the cams integral, and this is a three journal type. The shafts are machined, heat treated and hardened, the cams being ground accurately with master cams. The timing gears are three in number, and are of ma-

metal. All bearings are carefully fitted.

The Valve Mechanism.

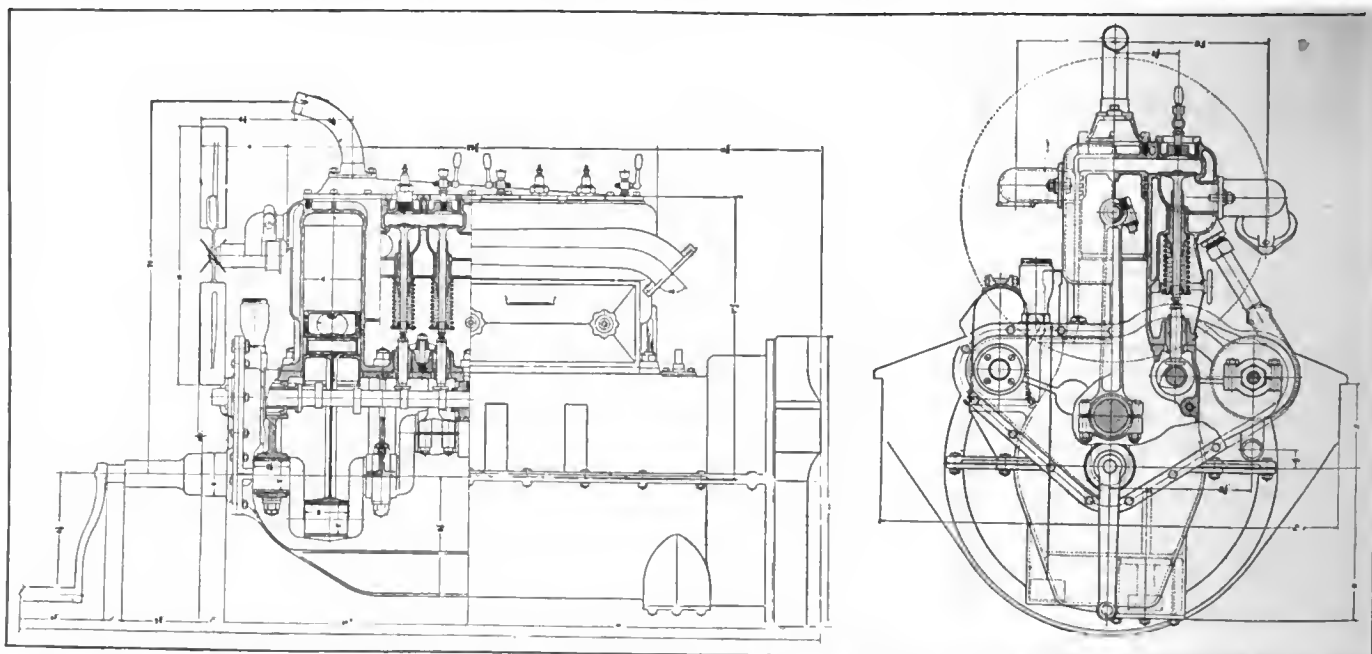
The valves are the usual 45-degree poppet type, $2\frac{1}{4}$ inches diameter, made from $3\frac{1}{2}$ per cent. nickel steel or tungsten steel as ordered, fitted with beveled split washers for retaining the springs. The valve stems operate in long cast iron guides that are renewable. The valve tappets are a mushroom type, having large diameter, fitted with adjusting screws and lock nuts. The tappets operate in cast iron guides that are retained by crabs and can be renewed when worn. The entire valve mechanism is enclosed with steel cover plates.

The engine is cooled by a circulation of water through the cylinder jackets, forced by a bronze centrifugal pump of large size. The water inlet and outlet manifolds are one casting and there are no joints. The manifolds are secured by studs and lock washers. The pipes are carefully proportioned to obtain a

forced through ducts drilled in the crankshaft to the crankpins, so that each bearing is flooded while the engine is running. A duct in the shaft of the idler gear further insures a supply of oil for the timing gearset. The oil distributed by the centrifugal movement of the crankshaft lubricates the cylinders and pistons, the cams and valve tappets, and by trapping in pockets the camshaft and wristpin bearings are supplied with lubricant.

An oil gauge on the crank case indicates by a float and ball the volume of oil in the reservoir, and there are maximum and minimum level indications, so that if the indicator is between these there is adequate lubricant and there is no reason for smoking nor danger to the bearings.

The exhaust manifold is cast iron and is gradually tapered in form to insure against back pressure. It is retained by studs and washers. A bracket is on the inlet side of the crank case for installing



Sectional Drawings of the Side and Front of the Type UU and Type TU Wisconsin Tractor Engines, Which Are Identical Save a Difference of a Quarter-Inch in Cylinder Bore.

chine steel, semi-steel and drop forged carbon steel. They are large diameter, have wide faces and are cut helically so that they are practically noiseless in operation. The gearset is accessible by removing the cover plate of the housing, and the gears and camshaft can be withdrawn from the case if there is need. The connecting rods are I section steel drop forgings heat treated. The wristpins are hollow steel tube, hardened and ground, fixed in the connecting rod, the ends oscillating in the bores of the piston bosses.

The main and the crankpin bearings are bronze cages lined with Fabrig metal, grooved to insure lubrication of the journals and pins, that may be adjusted with copper shims. The main bearings are all retained by through bolts, and the connecting rod caps are each retained by two chrome vanadium steel bolts. The camshaft bearings are phosphor bronze, and the bores of the piston bosses are bushed with the same

satisfactory circulation and high cooling efficiency. The engine is fitted with a large fan mounted on an annular ball bearing on an adjustable bracket at the forward end of the cylinder block that is driven by a flat belt from a pulley on an extension of the pump shaft. The fan is a single piece steel stamping, the spider and hub being of pressed steel. This fan bearing is fitted with a grease cup to insure lubrication.

Wisconsin Oiling System.

The engine is lubricated by the well tried Wisconsin system. The oil in the reservoir is drawn into the pump well through a screen filter and is forced by a gear pump, located on the outside of the lower section of the crankcase, driven by spiral gears from the camshaft, through a main duct cast integral in the crank case, and ducts in the transverse webs, to the main bearings and to the timing gearset case.

From the main bearings the oil is

a magneto, and the drive is by a short outside shaft driven by a gear of the timing gearset, the connection being preferably by an Oldham coupling. Any make of magneto may be utilized.

Much care is taken in assembling the engines. All studs and small bolts are retained by lock washers, and the larger bolts by castellated nuts and cotter pins. All of the work is accurately done and after assembling it is run on a belt, put on a testing block, run on its own power, and then given a long test running idle. It is next coupled to a hydraulic testing machine and further tested for power and efficiency.

Of the general work on the engines, all parts are machined and ground to gauges and all parts are inspected after each operation to insure that they are to the required standard of workmanship. All the steel is tested micrographically and with a scleroscope, to have the heat treatment precisely what will give a certain quality.

Trucks Convertible for Track and Road Work



Truck Chassis Equipped for Truck or Road Work Used on the 68-Mile Railroad of the Hetch-Hetchy Water and Power Project of San Francisco. The Leading Machine Is Used for Carrying Passengers and the Rear Unit for Handling Freights of All Kinds.

Extremely novel use is made of power truck and passenger car chassis by the engineers of the Hetch-Hetchy railroad, which is owned and operated by the city of San Francisco, Cal., and was built for the transportation of passengers and materials used in the construction of the great Hetch-Hetchy power and water project. The railroad is 68 miles long and extends from San Francisco to the work.

The machines have been adapted so that they are convertible and can be used on the railroad tracks or with changes of wheels driven on the highways. But practically all of their work has been on tracks, they taking the place as single units of what would ordinarily be independent power units—probably locomotives—and cars.

In the adaptation of the chassis the principal changes have been in the wheels. The forward wheels have been replaced by pony trucks, similar to those used on locomotives, which are each equipped with four small flanged wheels, and the rear wheels are fitted with flanges and drive the machines as originally designed.

The accompanying illustrations are of a train on the railroad, and a unit that is ready for turning. In the illustration of a train of two units the machine in the foreground is used exclusively for carrying passengers, and that attached to the rear of this unit is used for hauling express and construction material. In this the manner of coupling a power unit to a car is seen, this being similar to what is usually the vogue with railroads.

The other illustration shows a chassis equipped with a dumping body which is interchangeable with the body seen on the freight unit in the train of two machines.

In front of the rear wheels sand boxes are fitted with delivery pipes leading to the rails, and the discharge of sand is by compressed air that is contained in tanks

just back of the drivers' seats. The machine can be driven forward at any one of the three speed ratios and reversed, and for this reason must be turned when a terminal is reached. This might be done with a track turntable, or by a "Y"

in the illustration, and the jacks removed. When the wheels clear the ground the chassis can be swung on the turntable pivot and when turned the jacks are again used to lift the chassis and remove the blocking and lower the wheels to the track. The chains are removed from the pony truck and the turntable is secured to the main frame. The machine can then be driven on the track until turning is again necessary.

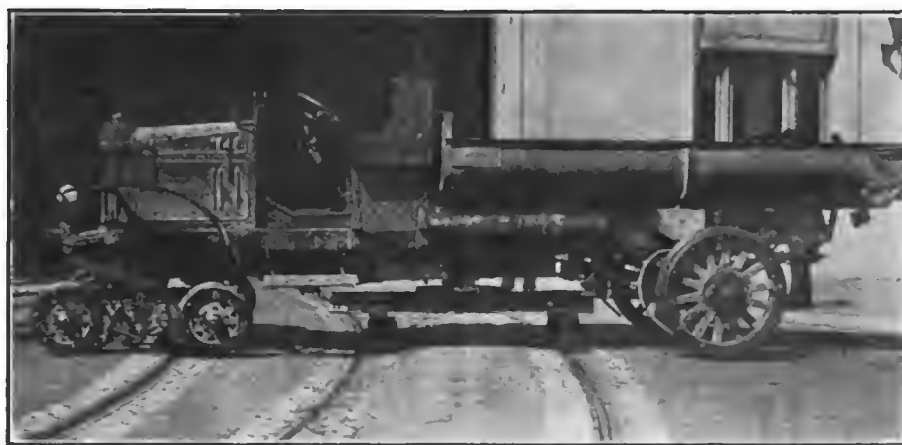
Seemingly turning is a long job, but the crew can do the work in a comparatively short time. The principal advantage is that the unit can be turned anywhere without additional track construction. The body of this machine can be changed to a platform or express type, or the chassis could be used with a passenger body if desired. The chassis can be converted from track to road service by removing the pony truck and the rear wheels and replacing the regular truck equipment. The railroad now has three chassis in service equipped with freight bodies and one for passenger service.

The chassis have many advantages as compared with any other type of power units, have ample speed and power for loads far in excess of what are hauled, and are always instantly available when needed. The operating cost is very small and but one man is required for each chassis or train.

PATENT SUIT DECISION FAVORS STROMBERG CO.

A decision has been handed down by the United States Circuit Court of Appeals for the Seventh District at Chicago, in the suit of the Stromberg Motor Devices Co., Chicago, against the Zenith Carhuretor Co., Detroit, the claim being that the Zenith carhuretor design infringed upon the Ahara patent owned by the Stromberg company. The contention of the plaintiff was sustained by the court and an accounting of profits by the Zenith company was directed.

The Lansing Forge Co., Lansing, Mich., has increased its capital from \$100,000 to \$300,000, which will greatly increase the scope of its operations and its facilities for production.



Truck Chassis Equipped with a Pony Truck in Place of the Front Wheels, and Flanged Rear Wheels, for Truck Service on the Hetch-Hetchy Railroad, and a Turntable Permanently Attached Under the Main Frame. When Turning Is Necessary the Truck Is Jacked Manually, After the Front Springs Are Chained to Prevent Sagging, and When the Blocking Is Placed Under the Lower Turntable Frame the Machine Can Be Pivoted in a Circle.



Mack 7½-Ton Tractor and Fruehauf 12-Ton Semi-Trailer Used by the Detroit Creamery Co., Detroit, That Carries Capacity Loads and Is Driven 50 Miles a Day at a Cost of 30 Cents a Mile and 2½ Cents a Ton-Mile.

Semi-Trailer Shows Large Haulage Economies

Exceptional economies are obtained by the Detroit Creamery Co., Detroit, a concern doing a large business in dairy products, with a Mack 7½-ton tractor and a Fruehauf semi-trailer that has a load rating of 12 tons, which is believed one of the largest units used for highway haulage. The tractor is a standard type, having the usual driver's cab, and the semi-trailer is unusually large, having combination panel and rack slides with spaces about midway between the forward and rear sections that are fitted with stakes that are removable for loading or unloading.

The body can be used open, in the event that the loads are bulky, or it can be covered with a tarpaulin, as is shown in the accompanying illustration, for protection of the freight in the event of storm or extremes of temperature. There is ample space under the cover for handling a load.

The outfit is used for hauling milk between different stations in the city and is usually driven in work that necessitates straight hauls of six miles, or 12 miles to the round trip. In one direction the freight is 250 cans of milk, which weighs approximately 12 tons, and in the other the freight will average 4¼ tons, which is equivalent to a constant load of 8¾ tons during the entire service time. The tractor makes four trips each way a day, or a total of 48 miles, and it hauls 65 tons of freight, or 390 ton miles.

The statement made by William Williams, superintendent for the company, shows that the cost of operation of record is 30 cents a mile, or \$15 for the distance driven each day, and this may be assumed to cover every item of expense, although the statement "debited cost of operation" might imply that all is not included. The figures given by Mr. Williams for general information show the work done by the vehicle and the cost, and are as follows. Mr. Will-

iams says: "We believe that the trailer transportation method is the most economical for either long or short hauls."

Number of trips per day.....	4
Number of miles per day.....	50
Tons handled one way.....	48
Tons handled on return.....	17
Average time per round trip, hours..	2½
Debit cost of operation, per mile....	30c
Miles per trip, loaded.....	6
Cost per trip.....	\$1.30
Average load per trip, tons.....	12
Cost per ton per trip.....	15c
Cost per ton per mile.....	2½c

BAUM CHANGES POSITIONS.

J. E. Baum, for a considerable period in the service department of the Nash Motors Co., at Kenosha, Wis., has been appointed manager of the service department of the Philadelphia Nash Motors Co., agent for Nash trucks and cars in Philadelphia.

E. M. Benedict of Toledo, O., has been appointed general manager of the Jackson Munitions Co., Jackson, Mich.



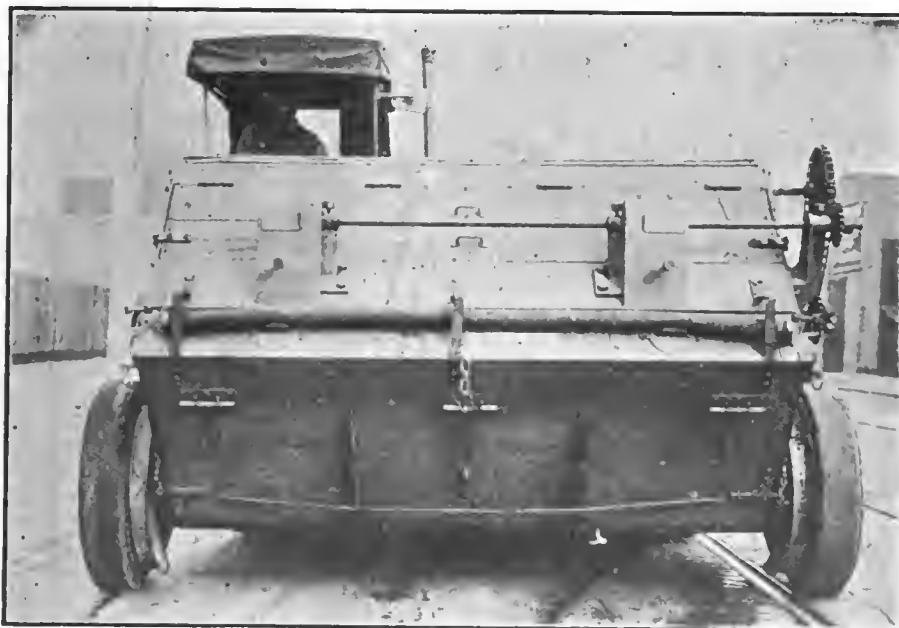
Cadillac Chassis and Ambulance Body, in Service of the Receiving Hospitals, Los Angeles, Cal., Equipped with Lavatory and Hot and Cold Water, Electric Fan and Electric Heating. Said to Be the Most Complete Vehicle of the Kind Ever Built.

Hospital Ambulance with Emergency Equipment

Designers of ambulance bodies have given in some instances much attention to the development of types that will make for the convenience of the driver and physician or attendant, and for the comfort of the patients. Cleanliness is extremely important, and aside from this requirement nearly all ambulances have been merely conveyances in which the attention given an occupant could be extremely limited, the supposition being that whatever was done would be emergency and would be incidental to thorough treatment at the hospital.

The Receiving Hospital at Los Angeles, Cal., a large institution where many accidentally hurt are treated, and which affords urgent medical attention for those who may be in need, has now in service what is said to be the finest ambulance ever built. The body is installed on a Cadillac chassis, which can be driven 70 miles an hour if speed is demanded by the condition of the patients, and it is equipped with a lavatory, with hot and cold water, so that the physician accompanying it can perform whatever surgical work he may deem best. There is an electric fan to lower temperatures if necessary and an electric heater to increase them when desirable.

Considerable ingenuity was exercised to equip the body. The water is heated almost instantly by driving the exhaust from the engine through a coil, and the electrical equipment has been increased in size to afford power for heating and for driving the fan. The body is entered at the side or at the rear, and the steps are a folding type that are dropped as the doors are opened, but at other times are out of sight in the body structure.



The Elgin Street Sweeper with the Sand Distributing Mechanism Permanently Installed, the Distributor Heads Being Removed When the Machine Is Used for Sweeping, the Same Box That Carries the Sand Being Used to Collect the Refuse.

Combination Street Sweeper and Sand Distributor

The superintendent of the street cleaning department of the Department of Public Works at San Francisco, Cal., has perfected a device with which the Elgin street sweepers used by his department can quickly be converted into most efficient sand spreaders, which can be driven over the streets during foggy and wet weather and distributes sand evenly on the surface of the slippery pavements, eliminating the danger for street traffic from skidding automobiles.

The sand is carried on the capacity carrying box of the street sweeper. This is fed from the box to two rapidly revolving discharging devices attached to the front of the machine and operated by the chain that drives the circular broom when the machine is used as a street sweeper.

The wheel that operates the sand spreaders is placed the same distance from the drive wheel as the wheel that operates the broom. It only takes a minute to remove the chain from the broom and place it on the wheel that drives the spreader.

One illustration shows the machine used as a spreader and another shows the machine when used as a street sweeper. The driving mechanism for the spreader is attached to the upper part of the sweeper, as is shown by the second illustration. All that is necessary to convert the machine to a sand spreader is to remove the lower door, from the capacity carrying box, and attach the door carrying the spreaders, as seen in the first installation. The attachment connected to the upper part of the sweeper seen in the second illustration does not limit the operating efficiency of the machine when used as a sweeper, so it is left on at all times. The machine can

carry three yards of sand in the carrying capacity box, which is sufficient to spread a considerable surface area of street. The distribution being mechanically done is even and far superior to hand spreading, as well as being vastly more economical.

SIEKERT ENTERS SERVICE.

Having received a commission as first lieutenant in the Motor Transport Corps, Frederick J. Siekert, Jr., formerly president and manager of the F. J. Siekert Co., Milwaukee, Wis., dealer in power trucks, has given over his business and reported for duty at Camp Holabird, near Baltimore, Md.

The 16th annual convention of American Road Builders' Association will be held at New York City Feb. 25-28 inclusive.



Elgin Street Sweeper Used by the San Francisco Street Cleaning Department with Two Sand Distributors, Operated by the Same Mechanism That Drives the Broom, by Changing a Driving Chain, a Conversion Made in Several Minutes. The Carrying Box Has Capacity for Three Cubic Yards of Sand. This Illustration Shows the Distributing Mechanism Installed.

HEADLIGHT STANDARDIZATION IN MICHIGAN.

The type of head lamp equipment for automobile vehicles and for tractors, provided that such machines are used on the highways, as there is reason to believe they will be in many states, is a subject of prime importance to those who reside in the country. Gov. Sleeper of Michigan has appointed a committee of seven to inquire into and make report on the subject of standardizing the lamps used in that state. The committee consists of Horace T. Thomas of the Reo Motor Car Co., Lansing; F. E. Watts of the Hupp Motor Car Corporation, Detroit; William E. Metzger of the Detroit Automobile Club, J. E. Schipper, Detroit; Charles E. Codley of the Edmund & Jones Corporation, Detroit; J. P. Replogle of the Remy Electric Co., Detroit, and H. J. Platz of the C. M. Hall Lamp Works, Detroit.

UNITED STATES RUBBER COMPANY SELLS BIG NOTE ISSUE.

The United States Rubber Co., which operates plants in a number of states outside of New England, has sold \$6,000,000 General Rubber Co.'s five-year seven per cent. notes to Kuhn, Loeb & Co., New York. The purpose of the sale was to pay in part the \$9,000,000 General Rubber Co.'s five per cent. debentures that will mature Dec. 1.

ARMY SHIPS 5000 TRUCKS TO FRANCE IN MONTH.

The enormous requirements of the American army in France for motor transport is little realized. These will increase as the army is added to. During September 5000 trucks of different types were shipped, according to Acting Secretary of War Benedict Crowell, some of them on the decks of vessels, but a very large number partly assembled to economize space.

PAIGE MODEL 50-18 TWO-TON TRUCK

*First Machine of the Series Designed to Standard Practice and Constructed of Units and Parts of Known Quality—
Is Worm Driven Type*



Standard Cab Equipment of the Paige Chassis, with the Door and Window Curtains Drawn to Afford Full Protection to the Driver.

PRODUCTION of the first of a series of truck chassis that will be built substantially to a standard design has been begun by the Paige-Detroit Motor Car Co., Detroit, a concern that for a number of years has been an important factor in the automotive industry, and has attained more than ordinary success because of the very general excellence of the machines it has turned out. The com-

pany has a large plant and unusually complete manufacturing facilities. At the time the nation entered into the European war the Paige company had made preparations to build trucks, and increased its works and equipment, but because of the needs of the government its activities were directed to producing machines that were essential for army purposes and commercial sale was deferred until a time when this demand had been satisfied.

The manufacturing plan of the company was primarily to build a series of chassis sizes that that practically meet the requirements of business transportation, and the general design and load ratings of the units were determined, but announcement to the public was withheld until there was reason to believe that distribution could be begun. The construction of trucks for military service served an excellent purpose, however, in that it added greatly to the experience of the engineers and the truck division of the company, so that there is certainty

that the trucks developed for industrial use will have every essential quality that is desired by those who require enduring and economical haulage units.

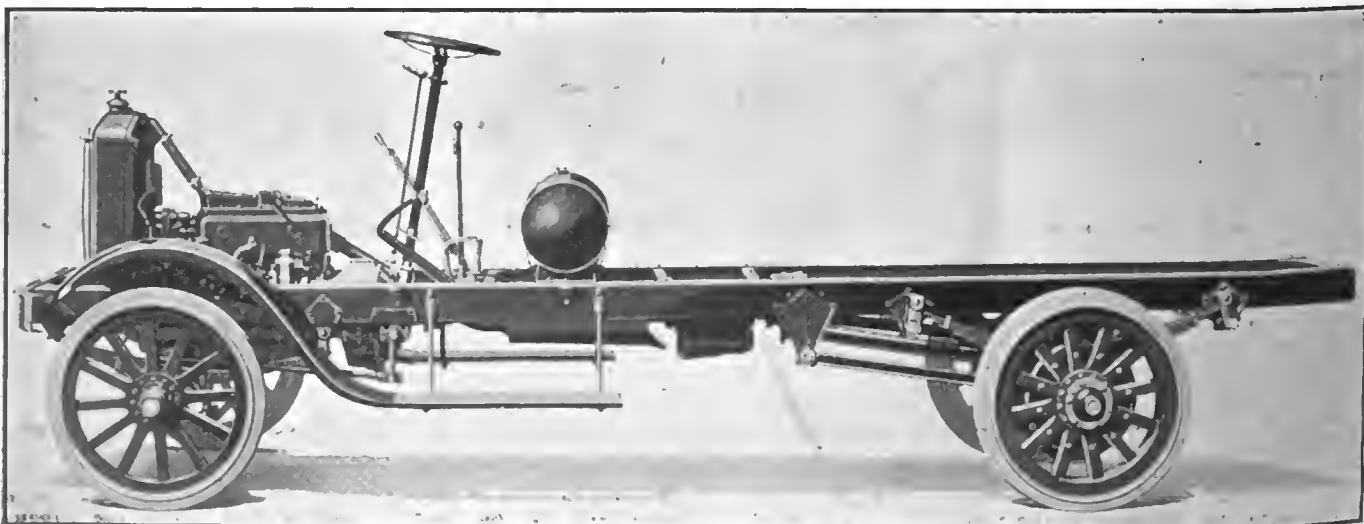
Will Build a Full Series.

The company states that the purpose now is to turn to truck production as rapidly as is possible in the readjustment of the industry and to produce the different sizes originally planned in numbers consistent with sales demands and the materials that are available. In anticipation of the operation of a truck division on a comparatively large scale the company has developed a sales organization and will be in position to operate this in harmony with its established selling policies.

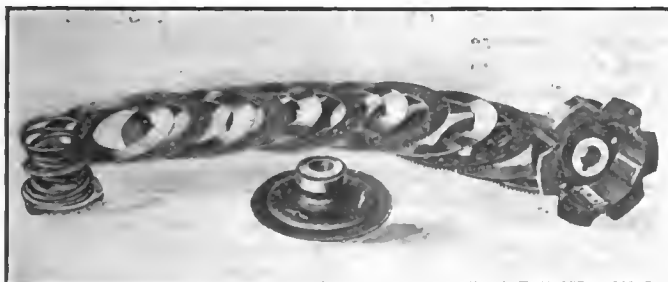
The first chassis produced is known to the trade as the 50-18, which has a load capacity of 2000 pounds. The constructing engineer selected so far as possible units and parts that are known to owners and drivers of power vehicles the world over, which are produced by specialists of known reputation. These components were regarded as being first of all what would establish truck value as measured by buyers generally, for they have been developed to sound engineering and have been perfected by expert engineers who have been guided by service experience and accurate knowledge of requirements with reference to endurance and operating economy.

Design to Standard Practice.

In the selection of these units there was insurance of having what is known as standard truck design, which is a considerable factor with those considering buying, and there was certainty that there would be every essential so far as relates to accessibility. The design was determined as conforming to recognized automotive practice as well, and much care was taken to simplify construction to obtain what could be adjusted and maintained with minimum labor, this being desirable from the viewpoint of those who believe in standardization of vehicle equipment. Much attention was directed



Chassis of the Paige Model 50-18 Two-Ton Truck, Without Dash, Driver's Seat or Hood, to Show the General Details of Design and Construction—In Every Respect It Conforms to Standard Practice.



The Paige Truck Clutch Disassembled, Showing the 12 Steel Plates, Six of Which Are Faced with Asbestos Fabric.

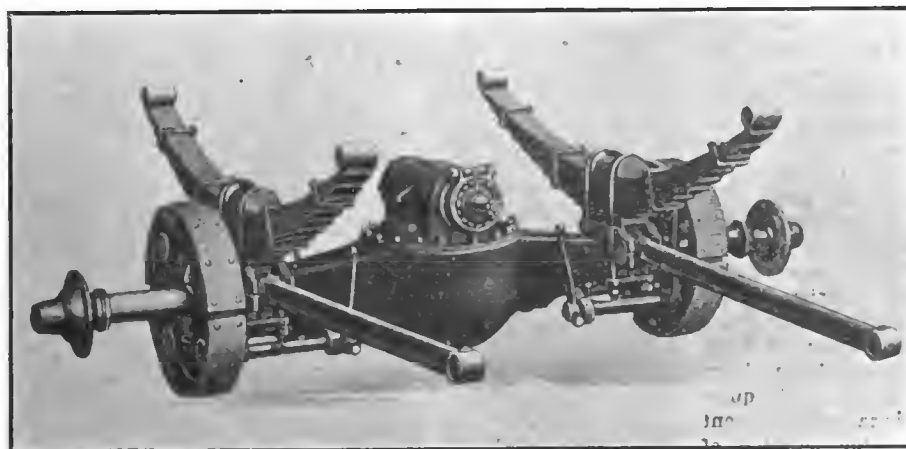
to protection of all wearing parts, to have contacting surfaces of large area and to afford means of adequate lubrication.

The chassis has wheelbase of 150 inches and tread of 56 inches, the body space back of the driver's seat being somewhat longer than the average for machines of this classification in load rating. The construction units include a Continental engine, equipped with a Bosch magneto with fixed spark, a Stromberg carburetor and a Pierce governor. The chassis is driven through a Timken worm shaft and worm wheel rear axle, fitted with Timken roller bearings throughout, and the front wheels are also equipped with similar bearings. The clutch is a dry multiple disc type and the transmission gearset is a selective sliding gear type, having three forward speed ratios and reverse.

Continental Four-Cylinder Engine.

The Continental engine is a four-cylinder, water cooled, L head, with the cylinders cast en bloc. The cylinder bore is $4\frac{1}{4}$ inches and the stroke $5\frac{1}{4}$ inches, this having a rating by the S. A. E. formula of 27.22 horsepower, but the manufacturer claims that it will develop approximately 40 horsepower at 1500 revolutions. This power is largely in excess of the requirements for normal haulage service.

The cylinder block is cast from a high grade of gray iron with the water jacket integral, there being liberal water chambers, especially over the heads of the cylinders. The block is cast with the head open, this being closed with a large plate that carries the outlet manifold, having a central channel from rear to front that directs the flow of water across the cylinder heads before passing to the outlet.



The Timken Worm Shaft and Worm Wheel Full-Floating Rear Axle Used in the Paige Two-Ton Truck, with the Springs, Brakes and Radius Rods Installed Ready for Assembly.

This plate is retained by a series of cap screws.

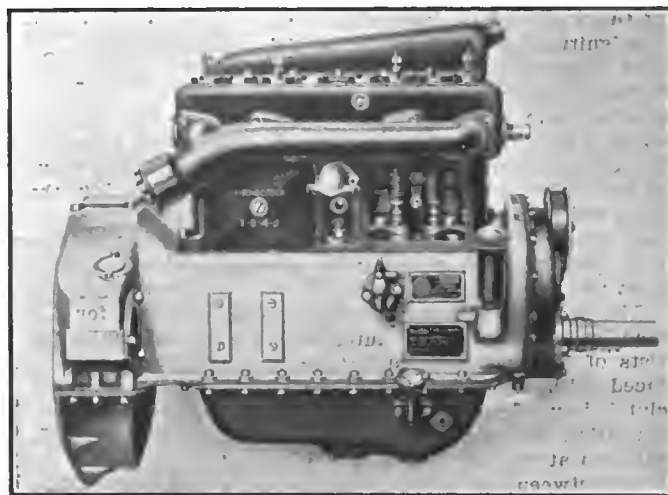
After the block has been rough bored and machined it is aged to insure against distortion strains and when aged it is finish bored and ground to size. Much care is taken to detect defects, the castings being tested under water pressure before and after ma-

chining, and the water passages are carefully cleared to obtain full freedom of water circulation. The pistons are cast from the same material as the cylinders and they are turned and ground to size, each being grooved for three diagonally split concentric expansion rings that are specially machined to relieve all strains and are accurately ground on the faces and sides. Oil grooves are also turned on the skirts of the pistons to insure the collection and distribution of oil on the cylinder walls. The bores for the wristpins are bored and reamed by special tools to obtain perfect alignment, smooth finish and accurate diameter, and all pistons are weighed and balanced.

The crank case is cast from aluminum in two sections, the upper half being divided by a vertical transverse web that carries the center main bearing for the crankshaft, and there are forward and rear extensions that house the timing gearset and the flywheel. The lower half of the case is practically an oil reservoir. There is a drainage plug and a clean-out opening in the bottom. By removing this section the main and connecting rod

bearings can be reached for inspection or adjustment. The support arms are cast integral with the flywheel housing of the upper section, and the lower part of the flywheel case is bolted to this. A cover plate, when assembled, houses the clutch.

The crankshaft is drop forged from a special steel with the flywheel flange and a flange at either side of the center journal integral, the journal flanges being designed to take the thrust from the clutch. The shaft is heat treated and ground to size. The journals are $1\frac{1}{4}$ inches diameter and are from front to rear $29/16$, three and $313/16$ inches length, this being a total length of $9\frac{3}{4}$ inches. The camshaft is a low carbon steel drop forging with the cams integral. It is $1\frac{1}{16}$ inches diameter and is mounted on three journals of ample size. The shaft is turned and the cams are rough machined. It is then annealed and heat



Right or Valve Side of the Continental Engine Used in the Paige Two-Ton Truck, One of the Latest Designs, with One Cover Plate Removed.

treated and finish ground. The shaft is so installed that it may be removed from the assembly by taking off the cover plate of the timing gearset.

Other Details of the Engine.

The timing gears are large, have wide faces and are helical cut, especial attention being directed to the maintenance of gear centers. The connecting rods are I section drop forgings, heat treated, that are bolted and reamed with special machine tools. The wristpins are steel tube, hardened and ground, that are seated in the piston bosses, the small ends of the connecting rods oscillating on the pins. The bearings of the crankshaft, connecting rods and camshaft are nickel babbitt, mounted in bronze cages, that are adjustable with shims. The wristpins are bushed with phosphor bronze. The valves are nickel steel heads electrically welded to carbon steel stems, and the tappets are a mushroom type, fitted with adjusting screws and lock nuts. Both valves and tappets operate in long, removable guides. The valve mechanism is completely enclosed.

The engine is lubricated by a combination pressure and splash system that consists of a double vertical plunger pump, driven by eccentrics on the cam-

shaft, that forces the oil from a screened well through copper tube to the timing gearset and the rear main bearing. The drainage flows to the oil pan and thence is distributed by splash of the connecting rod big ends to the cylinders, pistons, connecting rods, wristpins, cams and valve tappets. The camshaft bearings are lubricated by oil trapped in pockets, and lubricant is also trapped for the wristpins in the small ends of the connecting rods.

Forced Circulation of Water.

The engine is cooled by a circulation of water forced through the cylinder jackets and a spiral finned tube radiator of large size, by a centrifugal pump. The radiator tanks are sheet metal. The radiator is mounted to protect it against the stresses of chassis distortion. Radiation is supplemented by a fan carried on an adjustable bracket on the front end of the engine block that is driven by a flat belt from a pulley on the forward extension of the water pump shaft. The source of the ignition current is a Bosch high-tension magneto with fixed spark, the fuel is fed through a Stromberg carburetor by gravity from a gasoline tank under the driver's seat, and the engine speed is controlled by a Pierce governor. The engine is suspended by a trunnion at the forward end and at the rear by support arms cast integral with the flywheel housing, this insuring against cramping stresses from the chassis frame.

The power is transmitted from the engine by a multiple disc clutch that consists of 12 steel discs, six of which are faced with anti-friction material. The clutch is used without lubricant, is compensating for wear and requires practically no attention. There is a universal joint between the clutch shaft and the main shaft of the selective sliding gear gearset, which affords three forward speed ratios and reverse. The gearset is amidships and is supported at three points from cross members of the main frame.

Timken Worm Drive Axle.

The drive from the gearset is by a tubular shaft with a universal joint at either end to a Timken worm shaft and worm wheel rear axle of standard type. The axle is fitted with Timken roller bearings throughout, these being adjustable to compensate for wear. The front axle is also a Timken product and is a steel drop forging. The chassis frame, a semi-flexible type, is constructed from pressed steel channel section of generous width, with wide webs, the cross members being strongly reinforced and gusseted. The front cross member is formed as a hump, and the radiator is installed well in the rear of this to protect it from damage by contact.

The frame is carried on semi-elliptic springs, the rear set being shackled at either end, and the braking stresses and driving thrust are taken by radius rods, which are pivoted in hangers at the forward ends and in brackets combined with the spring seats of the rear axle, so that there may be free vertical movement of the axle. The rods are I sections and while comparatively light have large fac-

tors of safety. The wheels are wood, artillery type, with square spokes, that are shod with solid band tires, those of the forward set being 36 by four inches and those of the rear set 36 by seven inches.

The steering column is at the left side and the control is by foot pedals for the clutch and service brake, the throttle lever on the steering column, and hand levers for shifting the ratios of the transmission gearset and operating the emergency brake at the center of the foot-board.

The chassis is sold with the usual standard equipment for \$2950, and starting and lighting systems can be installed as extras. The intention of the company is to supply bodies, both standardized types and to specification, as soon as the release of the plant from war work is authorized, or existing contracts are completed.

HUPP PLANT PRODUCING ARMY VEHICLES IN VOLUME.

The Hupp Motor Car Corporation, Detroit, is practically 90 per cent. busy producing war orders, it having contracts to build 500 three-quarter ton trucks and 2500 ambulance engines of the standardized government type. The company is also producing machined parts for other manufacturers, some of which are designed for construction of class B trucks and tanks for army service. The company's passenger car production for the year will be about 9000 machines, or about 25 per cent. less than was produced in 1917.

FARM LABOR ADVISERS FOR DRAFT BOARDS.

The Department of Agriculture is naming men to work with the district draft boards in the various states as advisers regarding agricultural needs.

The agricultural advisers are not to be members of the district boards, but are to furnish to the boards facts relative to farm labor requirements, not only of their own districts, but of the entire country. Such information will be supplied to the advisers by the Department of Agriculture. The advisers also may concern themselves with individual cases before the district board. County agents of the Department of Agriculture have been supplied with questionnaires to be sent out for purpose of securing facts about farm labor needs in the counties.

GENERAL MOTORS ABSORBS THE CHEVROLET.

The stockholders of the General Motors Corporation have voted to absorb the Chevrolet Motor Co., and this was in accordance with the plan by which the holders of Chevrolet stock receive 117 shares of General Motors common stock and 44 cents for each share.

The balance sheet of the Chevrolet Motor Co., as of Oct. 11, shows assets of \$73,546,042, consisting of \$278,042 cash and 732,680 charges of General Motors common stock valued at \$73,268,000, and liabilities of 641,095 shares of capital stock valued at \$64,109,500, and surplus and undivided profits of \$9,436,542. A dividend of \$3 a share on common stock of the General Motors Corporation was declared, payable Nov. 1, at the Guaranty Trust Co., New York City, and Chevrolet stockholders who do not convert their stock prior to that date will receive a cash equivalent on presentation of the stock.

WILLYS-OVERLAND, INC., TO MOVE EXPORT OFFICES.

Because of the prospect for very greatly increased business following the close of the war the headquarters of the export department of Willys-Overland, Inc., is to be removed shortly to New York City. Export Manager R. T. Williams will locate in the metropolis, where he will be joined by E. C. Morse, who is now representing the Willys-Overland interests at Washington, and who will be connected with the export department.

The creditors of the Regal Motor Car Co., whose claims were secured by first mortgage gold notes, will be paid in full. The unsecured creditors will receive from 20 to 25 per cent. of their claims, according to statement by the Security Trust Co., Detroit, receiver for the company.



Two of the Fleet of Federal Trucks in the Service of the Denver, Col., Gas and Electric Light Co.

**WANT PATTERN AND TOOL PLANT
AT LOUISVILLE.**

Louisville, Ky., has what is known as the "Million Dollar Factory Fund of Louisville, which had been created for the purpose of attracting industrial concerns to that city. Tempton Aubuchon, general manager of the fund, announces that a special committee, composed of representatives of a number of large manufacturing concerns, has been authorized to negotiate with manufacturers of tools, dies, wood and metal patterns, with a view of locating a tool and pattern plant in the Louisville industrial district.

The need of such a concern is acute, statement being made that during the past few years 59 different metal working plants have greatly increased in proportions. The committee is now negotiating with several companies and may induce one to establish itself in Louisville or vicinity.

**LANSING COMPANY'S INDUSTRIAL
TRUCK TRAILERS.**

The Lansing Co., Lansing, Mich., which has been building electric industrial truck trailers of the Reynolds type to fill a government order, has received a large additional order for these vehicles. With this the plant is on a 90 per cent. war basis. Of the production 70 per cent. is sent directly to the government, and 20 per cent. is sent indirectly. The new contract requires the production of 400 trailers a week until the order is filled.

**CHICAGO PNEUMATIC TOOL CO.'S
BIG MORTGAGE.**

The stockholders of the Chicago Pneumatic Tool Co., Chicago, have authorized the issuance of six per cent. refunding mortgage bonds at par, not to exceed \$5,250,000, under mortgage deed of trust to the Central Trust Co. of Illinois, or such other company as may be designated by the directors, the proceeds to be applied to the extension of plants and the retirement of remaining outstanding bonds under the existing mortgage.

**MILLER IS CLEVELAND NEW ENGLAND
MANAGER.**

R. J. Miller, formerly connected with the Studebaker Corporation, has been appointed district sales manager for New England for the Cleveland Tractor Co. to succeed H. S. Ketcham, who recently resigned that position. Mr. Miller's headquarters are in Boston with A. H. Sowers, who is agent for Eastern Massachusetts for Cleveland tractors.

**CHIEF MOTOR COMPANY OF PORT
HURON.**

The Chief Motor Co., Ltd., of Toronto, Ont., has been incorporated with a capital of \$1,000,000 and it has located at Port Huron, Mich., where it will operate a plant for the production of gasoline engines of a type adapted for truck and tractor propulsion. It will employ at first a force of about 200 hands.

**FULLER & SONS MANUFACTURING
CO.'S SERVICE DEPARTMENT.**

Announcement is made by Fuller & Sons Manufacturing Co., Kalamazoo, Mich., manufacturer of clutches, transmission gearsets and control members, of the appointment of O. E. Harmon as service manager, who is now directing the activities of that department. M. E. Fuller has been appointed employment supervisor, and the employment department has been organized under the direction of Dr. Blackford, who is known internationally as an employment expert. Statement is made that the company expects to greatly increase the efficiency of its plant, insure better production and improve the standard of service to customers to the greatest possible degree.

CLEVELAND SECTION, A. S. M. E.

The American Society of Mechanical Engineers has established a section in Cleveland, known as the Mechanical Section of the Cleveland Engineering Society. The petition for this section was made jointly by members of the local society and by members of the national society, resident in Cleveland. This new section comprises the towns or cities of Akron, Barberton, Bedford, Chardon, Cleveland, Cuyahoga Falls, East Cleveland, Elyria, Hudson, Kent, Lakewood, Lorain, Massillon, Quarryville, Ravenna, Sandusky, South Euclid, Wickliffe, Willoughby and Wooster, totaling a society membership of approximately 260 at the present time, the sixth largest in the country.

AUTO INDICATOR CO. FORMED.

W. W. Huelster is president, I. C. Cilley vice president, and Joseph Renihan is secretary and treasurer of the Auto Indicator Co., a concern recently organized at Grand Rapids, Mich., for the manufacture of an instrument known as an automobile indicator. The company was organized by the above officers and V. I. Cilley, who is general manager, and James Ritzema and Dr. E. O. Cilley, who with the others named, constitute the board of directors.

**BEMENT JOINS THE TRANSPORT
SERVICE.**

The activities of the Lincoln Highway Association, which practically ceased at the beginning of the war, will not be resumed until normal conditions obtain. A. F. Bement, secretary of the organization, has enlisted in the Motor Transport Corps and is now at the officers' training camp at Jacksonville, Fla.

**CHIEF MOTOR CO. HAS CONTRACT
FOR TRUCK ENGINES.**

Statement is made that the Chief Motor Co., Port Huron, Mich., has been awarded a contract to construct 4000 engines to be used in the construction of trucks for army transport service. The company has planned to produce these as rapidly as is possible and its working force will be augmented with this in mind.

**BISHOP WHITE DEAD FROM PNEU-
MONIA.**

Bishop White, treasurer of the Pratt & Cady Co., Hartford, Conn., and vice president and general manager of the American Chain Co., Bridgeport, Conn., died at his home at West Hartford, Oct. 27, from pneumonia, aged 33 years. He was born at West Hartford and immediately after being graduated from college he engaged in banking in New York City, and later became a manufacturers' representative in automobile supplies. He became associated with the Weed Chain Tire Grip Co. in 1911, and when the American Chain Co. was incorporated in 1912 he went to Sherrill, N. Y., to organize and manage the concern. Later this company absorbed the Weed company and the plant was established at Bridgeport. He then became vice president and general manager. He reorganized the Pratt & Cady Co. in 1914. He was widely known in the automotive industry and with the trade.

ROMAINE A DIVISIONAL DIRECTOR.

W. L. Romaine has been appointed a director of the division of oil conservation of the Fuel Administrator for Wisconsin, this being a new office created for the purpose of administration of regulations and rules having to do with the uses of fuel, lubricating and other oils, as well as gasoline and all petroleum products. Mr. Romaine is secretary of the Badger-Packard Machinery Co., Milwaukee, Wis.

**DES MOINES WILL HAVE TRACTOR
SHOW.**

The Des Moines, Ia., Thresher and Tractor Club, an organization of dealers in farm power machinery and implements, will hold its first exhibition in that city the week of Jan. 13-19, under the management of H. J. Clark.

**WANT POWER VEHICLE TAX STRICKEN
FROM WAR REVENUE BILL.**

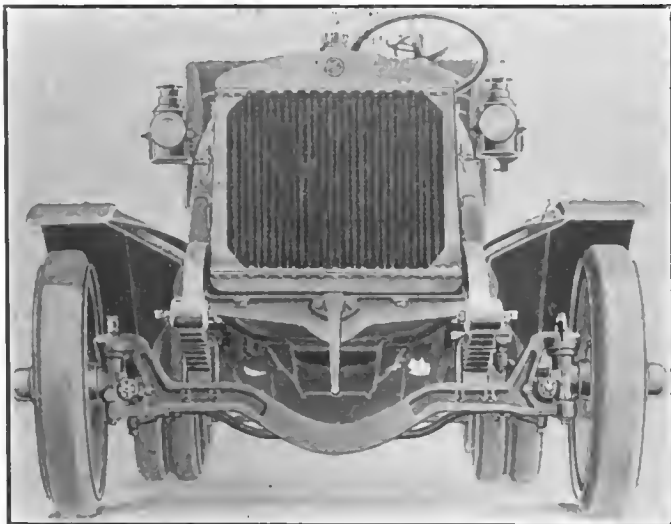
A proposition will probably be made to Congress that the proposed tax of five per cent. on all power vehicles sold, to be paid by the owner, as well as the Federal license or excise tax, also payable by owners, be stricken from the war revenue bill because, first, power vehicles have been demonstrated to war, and second, were taxes imposed this would retard production of machines to a considerable degree and would undoubtedly affect the industry in resuming manufacturing operations.

**DEARBORN TRUCK CO. BUYS SMITH
MATERIALS.**

The materials of the Smith Motor Truck Corporation, sold by order of the court of bankruptcy, has been purchased at auction sale by the Dearborn Truck Co., Chicago, and will be removed to the new Dearborn plant at Chicago. The Dearborn company is now building worm driven trucks of 1½ and 2½ tons load capacity, and chain driven trucks of one and two tons load rating.

ACME FIVE-TON MODEL E TRUCK

Constructed to Same General Design as Smaller Units, But Has Continental Type B-2 Engine and Semi-Flexible Frame



Front View of the Model E Acme Completed Chassis, Showing the Timken Axle, Spiral Tube Radiator and the Generally Heavy Construction.

A NNOUNCEMENT is made by the Acme Motor Truck Co., Cadillac, Mich., builder of Acme trucks, that it has realized its manufacturing plan with the commercial production of a five-ton chassis, which has been given the trade designation of model E. This unit is now being built in sufficient numbers to insure reasonable delivery and the expectation of the sales department is that practically all demands can be met satisfactorily.

The growth of this concern has been consistent and constant, and comparatively rapid. It was originally established to operate in a small way, the purpose of the executives being to specialize the production of a single type of chassis, which had been designed after a careful survey of the manufacturing and sales possibilities.

The constructing engineer of the com-

pany determined that there would be at least greater initial economy by combining in an assembly units that had been developed by specialists and were recognized in the industry as having what might be regarded as standard quality—that were known to owners and drivers of power vehicles because of general usage—that had been found by extended service experience to have satisfactory endurance and were known to service stations and repair men, so that in the event of

need, adjustment or restoration, could be undertaken without recourse to experts specially trained to one particular design or construction.

Built of Standard Units.

The main object was to produce machines that were so generally known that service could be obtained anywhere and at any time that would be uniformly good and at minimum expense. This was only possible through the use of the products of concerns that had established reputations, that had developed units by the careful experimental work of engineering staffs and knowledge gained of long continued use, that produced them in considerable numbers at least with superior manufacturing facilities, and by standardization of design sold them at the lowest prices that were consistent with high grade workmanship and special materials.

Having selected these units the com-

pany made a special endeavor to establish the quality of the chassis it builds by the use of the trade phrase "truck of proven units." The demand for the chassis was surprisingly large and the sales organization was developed in comparatively short time. There was, however, a demand for machines of other sizes. The first chassis was built to have two tons load capacity, and following this a one-ton and then a 3½-ton chassis was built. In the construction of these the original design was followed, the principal difference being in the dimensions of the units.

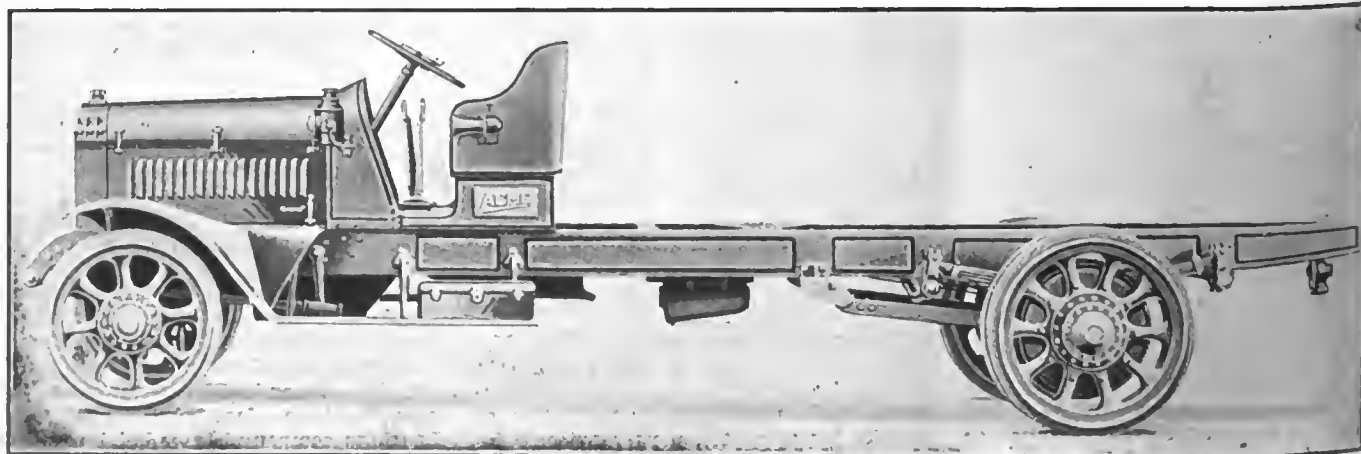
Plant Has Large Facilities.

The increase of the number of chassis to three and the production requirements necessitated the expansion of the plant and the addition of machine tools, and so rapid was the growth that considerable work, especially body construction, was done to contract by other concerns. The decision to build the five-ton chassis impelled the company to acquire the plant of the Cadillac Machine Co., which has been adapted and equipped to complete the manufacturing needs, and the capital, which had been from time to time added to, was increased to \$900,000, so that the works now have adequate facilities for building a large number of each size unit and the resources are such that operations can be on a very much larger scale.

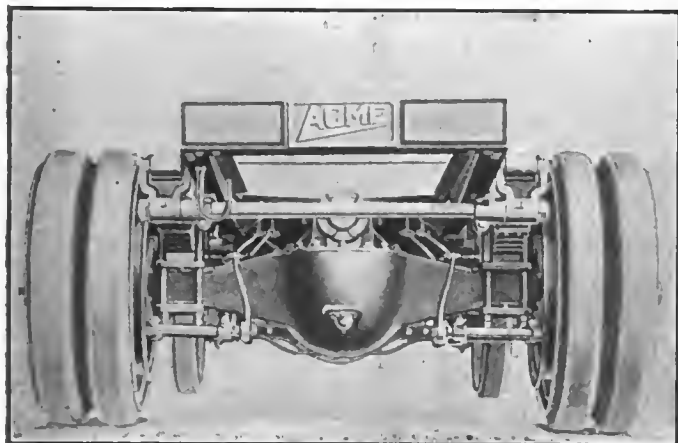
The company has become well established throughout the country, having sales representatives in the commercial centers of importance, and a very thorough and well planned business development campaign is in progress. That its agents might be able to compete with other concerns producing trucks in varying capacities from one to five tons and to meet every demand by business men for haulage equipment, the model E chassis was designed and developed.

Engine a Continental B-2.

The model E Acme truck units are stated to be the same as those incorporated in the other three Acme trucks, but the engine is the Continental type B-2, which is the latest designed and most highly perfected yet produced at the Con-



Side View of the Acme Model E Truck Chassis, Which Has Unusually Long Loading Space—The Semi-Flexible Radiator Rods Have No Universal Action—The Transmission Gearset May Be Noted Amidships.



Rear End View of the Aeme Five-Ton Truck That Shows the Spring Suspension Mounting on the Axle and Frame, and the Heavy Spring Shackle Tie Rod.

tinental works. This engine is distinctively a heavy duty type, being somewhat slower in speed than other Continental constructions, but develops high power. It is a four-cylinder, four-cycle, water cooled, L head design, with cylinder bore of $4\frac{1}{4}$ inches and stroke of six inches, which is rated at 36.10 horsepower by the S. A. E. formula, but the builder claims that it will produce 55 horsepower by actual brake test when driven at normal speed. This is largely in excess of what would be required for any work for which a freight vehicle would be used. With the long stroke the engine has unusually good power production at comparatively slow speeds, which is a very desirable quality when space is limited and power is essential for starting, as in soft surfaces.

This engine differs with other Continental designs in that the cylinders, which are cast in pairs, have detachable heads. This insures that the water jackets, which are cast integral with the cylinder units and the heads, will be uniform and can be thoroughly cleaned, so that there will be perfect freedom of water circulation. The walls of the jackets can be uniform in thickness, which makes for more efficient cooling and more positive lubrication. The type, detachable head, also insures more economical service in lower fuel consump-

tion, for by removing the heads the pistons and combustion chambers can be easily and effectually cleaned of deposits of all kinds. This work cannot be accomplished to the same degree of completeness without removing the cylinder blocks in the other models, nor as cheaply with reference to labor.

Like all Continental engines, much care has been given to obtaining large factors of safety for every part and there should be exceptional endurance of these units with ordinary care and attention. The cylinder units are cast with the cylinders in pairs and with the water jackets integral from a high quality of gray iron. After cleaning they are tested under water pressure to detect possible causes for leakage, and after being rough bored are aged to insure against distortion from machining strains. Next the cylinders are finish bored and finished by grinding to size. The heads are carefully cleaned to have thoroughly cleared water chambers, and they are machined for the fittings. Each head has at the center the connection for the water outlet manifold.

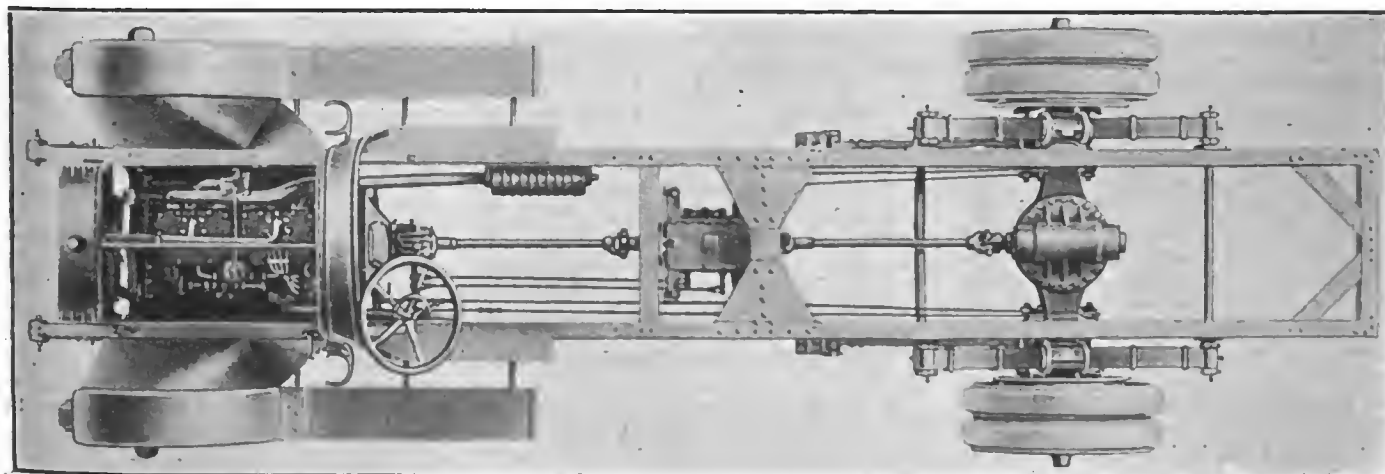
The pistons are cast from the same quality of gray iron as the cylinder units, and these are turned and ground, each piston being grooved for three diagonally split concentric expansion rings. The rings are relieved from all strains by a special machining process and they are ground on the faces and sides. To insure distribution of the lubricant oil grooves are turned on the skirts of the pistons. The bores for the wristpins are made with special machines and are reamed with much care to obtain perfect alignment and accurate diameters. All the pistons are weighed and balanced, so that the reciprocating parts of each engine will balance.

The crank case is cast from aluminum in two sections, the upper half having a central vertical transverse web that carries the center main journal of the crankshaft. This section has forward and rear extensions that house the timing gearset and the flywheel, and integral with this are cast the rear support arms for the suspension of the engine in the chassis. The lower section contains the oil reservoir and it is fitted with a drain plug and a clean out, so that the reservoir may be cleaned. By removing this section the main and connecting rod bearings may be examined and adjusted without removal of the unit from the chassis. The crankshaft is a three-journal type, drop forged from a special alloy steel, with the flywheel flange integral, and there is a flange at either side of the center journal to take end thrust. The shaft is ground to dimensions and is heat treated. The camshaft is also a drop forging, having three journals, with the cams integral, and this is machined, hardened and ground.

The timing gearset gears are large, have wide faces and are helically cut, much care being taken to obtain accuracy of gear centers. The connecting rods are I section steel drop forgings, heat treated, and they are bored and reamed with special machine tools to insure correct centers and alignment. The caps are retained by nickel steel bolts and locked nuts. The wristpins are made from special steel tube, annealed, hardened and ground. These are secured in the piston bosses by locking devices. The crankshaft, camshaft and connecting rod bearings are a high grade of nickel babbit, the crankshaft and camshaft connecting rod bearings being mounted in bronze cages. The bearings for the wristpins in the small ends of the connecting rods are bronze bushings.

Valves, Cooling and Lubricating.

The valves are interchangeable and are nickel steel heads electrically welded to carbon steel stems, the stem ends being hardened to resist the wear of the tappets. The valves are mounted in long guides that may be renewed when worn. The valve tappets are a mushroom type, that are carried in heavy renewable guides, that are fitted with adjusting nuts



Plan View of the Five-Ton Aeme Chassis, the Strongly Braced and Reinforced Semi-Flexible Frame, the Spring and Transmission Gearset Suspension, and the Driving System Being Clearly Shown.

and screws. The valve mechanism is fully enclosed by cover plates that can be quickly removed by taking off winged nuts.

The engine is cooled by a circulation of water through the jackets, forced by a centrifugal pump, and by a vertical finned tube radiator with cast top and bottom tanks, that is mounted on a cushioned base to minimize road shock. Radiation is supplemented by a fan mounted on an adjustable bracket on the forward cylinder unit that is driven by a flat belt from a pulley on an extension of the water pump shaft.

The lubrication is a new feature with Continental design. The oil is drawn from a screened well in the reservoir by a gear pump, and it is forced through tube to the main bearings, to the crank pin, camshaft and wristpin bearings and the timing gearset, this insuring a flood of lubricant at all times. The drainage flows to the bottom of the crank chamber, whence it is distributed by splash to the cylinders, pistons, cams and valve tappets. The overflow from the oil troughs drains to the reservoir for continued circulation.

The Engine Auxiliaries.

The engine is equipped with an Elsemann water proof type magneto, with variable spark control, and it is fitted with an impulse starter to insure quick and easy starting. The fuel is fed through a Rayfield carburetor by vacuum system from a 26-gallon welded steel tank under the driver's seat. The engine is governed by a specially designed governor of the fly ball type, that is mounted on the cover of the gear case, and is driven by the generator drive shaft. Being built integral with the engine there is no possibility of it being inoperative. The governor is set to a maximum vehicle speed of 12½ miles an hour.

The Power Transmission System.

The clutch is a Borg & Beck single dry plate type that requires no adjustment or lubrication and comparatively no attention. The drive from the clutch is through a 1½-inch heat treated steel shaft with a universal joint at either end to the main shaft of the Cotta selective type sliding gear transmission gearset, which has three forward speed ratios and reverse, which is mounted amidships and is suspended at three points. The gears of this gearset are always in mesh and there is no possibility of the gears being stripped by careless drivers.

The main driving shaft is 1¾ inches diameter, heat treated steel, with a universal joint at either end, and this is coupled to the pinion shaft of the Timken worm shaft and worm wheel rear axle, which axle is equipped with Timken adjustable roller bearings. This axle is a full-floating type and the driving shafts are heat treated and are splined at the ends fitted in the hubs of the differential gears. The front axle is a Timken construction, an I section steel drop forging, that is fitted with Timken roller bearings. This axle is four inches deep, with ¾ inch web and 2½ inch flanges.

The Frame and Other Detail.

The frame is constructed of steel channel section, nine inches width, with wide

flanges, that is a semi-flexible type, with heavy cross members, strongly reinforced and gusseted. The frame is heat treated and is assembled by hot riveting. It is suspended on semi-elliptic springs, which are self-lubricating and have bronze bushed eyes, the front set being 44 inches long and three inches wide and the rear set 56 inches long and four inches wide. The rear springs are shackled at both ends and are fitted with tie rods for both sets of shackles. The torque is taken by the springs, but the driving and braking stresses are taken by radius rods, which are rolled steel sections, semi-flexible, this eliminating universal action.

The wheelbase is 180 inches and the chassis length overall is 261 inches. The tread is 68½ inches forward and 69¼ inches rear. The wheels are cast steel, with three-inch spokes forward and four-inch spokes rear, which are shod with 36 by six-inch tires forward and 40 by six-inch dual tires rear.

The Ross Irreversible nut and screw type steering gear is installed at the left side, this being fitted with a 22-inch hand wheel. The control is by foot pedals for the clutch and service brake, hand levers of the steering column for the ignition and fuel control, and hand levers for shifting gear ratios and the emergency brake at the center of the footboard. The brakes are both internal expanding type, operating within drums 24 inches diameter on the rear wheels.

The standard type chassis frame affords a loading space behind the driver's seat 160 inches long. This will give a body suited for light, bulky loads without excessive overhang of the main frame. The turning radius required is 32 feet. The chassis is sold with a driver's seat, front fenders and running boards, dash and tail lamps, mechanical horn, jack, kit of tools and tool box, and a priming coat of gray paint. No statement is made by the company relative to body equipment, but it will probably, as is its custom with other chassis, supply standard types from stock productions of its body department, and build bodies to owners' specifications, so that, if desired, the complete vehicle can be delivered.

Incidentally statement should be made that the company uses other Continental red seal engines, one with bore of 3¾ and stroke of five inches, developing 35 horsepower, though rated at 22.50 by the S. A. E. formula, for the ton truck chassis; one with bore of 4¼ inches and stroke of 5¼ inches, developing 40 horsepower, though rated at 27.25 by the S. A. E. formula, for the two-ton chassis, and one with bore of 4½ inches and stroke of 5½ inches, developing 45 horsepower, though rated at 32.20 by the S. A. E. formula, for the 3¼-ton chassis.

COLLEGE WILL TRAIN MEN FOR FOREIGN TRADE.

A foreign trade school that will train men to engage in and specialize this branch of commerce has been opened by the division of vocational subject and civic administration of the College of the City of New York, and the purpose is to

have men ready to deal with the great diversity of subjects that will be met with in exploiting trade abroad. If the object of the promoters is realized this school will prepare students whose services will be available for commercial and industrial interests.

The instructors in the school include W. H. Brittain, secretary and treasurer of the American Steamship Association; H. C. MacLean, district manager for the United States Bureau of Foreign and Domestic Commerce; S. S. Brill, former special agent for the same bureau; W. W. Orr, assistant secretary of the National Association of Credit Men, and E. E. Judd of the foreign department of the Guaranty Trust Co., New York, N. Y.

NEW REPUBLIC TRUCK SERVICE HEADQUARTERS.

The service organization of the Republic Motor Truck Co., Alma, Mich., has been very greatly developed, this being accomplished by the location of what may be termed regional service headquarters in New York City, Chicago, Kansas City, Los Angeles and Atlanta. From these centers the parts and units required by the branches and the 1300 local service stations of the country will be distributed, and organization and system have been determined which will afford quick communication and delivery.

WILL CONTINUE BUILDING GLOBE TRUCKS.

The real estate, shops and equipment of the Globe Motor Truck Co., East St. Louis, Mo., has been bought at auction sale by John T. Soy, a stockholder in the company. The property consists of several buildings on a tract of land 226 by 563 feet, adapted for manufacturing, with machine and hand tools. Statement is made by Mr. Soy that he will continue the production of Globe trucks, but no announcement of plans or policies has as yet been made.

EMERY IS MANAGER OF DETROIT PLANT.

With the retirement of Charles B. Bohm as manager of the Detroit plant of the Aluminum Casting Co., a position he held for several years, Howard Emery, who was manager of this division and later made manager of the company's works at Manitowoc, has been transferred to Detroit to fill the vacancy.

MCDONALD IN CHARGE OF STOUGHTON WORKS.

Because of the illness of George Ford, manager of the Mandt vehicle branch of the Moline Plow Co., at Stoughton, Wis., B. T. McDonald, manager of the Poughkeepsie, N. Y., works of the company has been temporarily transferred to Stoughton, because he is familiar with its operations, having been manager before he was located at Poughkeepsie.

The Hercules Motor and Manufacturing Co., Canton, O., has appointed E. H. Geyer its general sales manager.



Ready for the duty asked—

It's hard, when you see a squadron of planes at rest, to picture them as a mechanical device that has overcome the Law of Gravity. For they are heavier than air. And if you hold a Hess-Bright Ball Bearing in your hands it is equally as hard to picture it as an ingenious device that has all but mastered friction. For it is simply a rugged collar of steel encircling a set of true spheres of steel. And it is so small compared to other important parts

in plane and engine construction. But there are none that are more important. Speed, climbing power, control, engine action—all are dependent on bearing performance. Twenty-six places exist where Hess-Bright Ball Bearings will help to build air supremacy. That's why makers of planes buy the best. For while the Hess-Bright first cost is more, in the long run it is the least expensive. And it has been by the performance it gives that its reputation has been established.

THE HESS-BRIGHT MANUFACTURING COMPANY
Philadelphia, Pennsylvania

Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

CANCEL ARMY TRUCK CONTRACTS

STATEMENT is made that the War Department of the government has authorized the cancellation of contracts existing and contemplated for 81,000 trucks for army service. The total number covered by contracts and proposed contracts is not stated. In some instances new orders, authorized or proposed, have been withheld. Some contracts for which work has been begun, have been modified, the number of vehicles being reduced approximately one-half.

The following statement includes but a small part of the contracts, but it is sufficient to show to what extent the industry will be affected through the cancellation and modification of contracts. The total number of vehicles included in these contracts was 15,935, and with the cancellation of orders given the Peerless and Garford company for 3000 and 4000 1½-ton trucks, and the reduction of the others 50 per cent. the total that will be produced will be 4568.

Contractor	Order ing	Load Rat-	Modi- fied Or- der
Federal Motor Truck Co.	500	3½	250
Federal Motor Truck Co.	300	5	150
Gramm-Bernstein Motor Truck Co.	100	3½	50
Hurlburt Motor Truck Co.	200	5	100
International Motor Co.	200	2	100
International Motor Co.	800	2	400
Kelly-Springfield Motor Truck Co.	920	3	460
Kelly-Springfield Motor Truck Co.	340	1½	170
Moreland Motor Truck Co.	40	2½	21
Moreland Motor Truck Co.	60	4	30
Packard Motor Car Co.	3,000	3	1500
Peerless Motor Car Co.	500	3	250
Peerless Motor Car Co.	2,000	1½	*
Republic Motor Truck Co.	250	5	125
Standard Motor Truck Co.	300	3½	150
Velle Motors Corp.	125	3	63
Pierce-Arrow Motor Car Co.	1,100	2	700
J. C. Wilson Co.	200	2	100
Garford Motor Truck Co.	4,000	1½	*
Total	15,935		4,568

*Cancelled.

The situation with reference to the automotive industry in bald facts is this: Following the policy established by the government many of the concerns building passenger cars converted their manufacturing departments as nearly as possible to the 100 per cent. war basis required by Jan. 1. The truck manufacturers planned and were preparing to do all the essential war work possible in addition to building the trucks allowed by the order of the War Industries Board.

Cessation of conflict, the armistice and the collapse of Germany means that these industries must resume normal manufacturing operations as quickly as possible. If government work ceases entirely there will be an interim of inactivity, with enforced idleness of labor, unless some of the work authorized by the government can be continued. In other words, if government work is terminated by cancellation of existing contracts labor will be idle unless other employment can be found.

Because of this fact quick action has been necessary and constant conferences have been held by the War Industries Board, the Automotive Products Section of the board, the War Department, the United States Employment Service and other bodies that have jurisdiction and can control the situation largely through the contracts existing.

The National Automobile Chamber of Commerce, representing the industry, has been extremely active because of the uncertainty of the interests until a definite policy has been announced by the government. The National Automobile Chamber of Commerce has a committee consisting of Hugh Chalmers, Alvan MacCauley of the Packard Motor Car Co.; H. B. Jewett of the Paige-Detroit Motor Car Co., Ray D. Cbapin of the Hudson Motor Car Co., Col. Charles Clifton of the Pierce-Arrow Motor Car Co., representing the passenger car manufacturers, and George H. Graham of the Pierce-Arrow Motor Car Co.; Windsor T. White of the White Co., L. H. Boylston of the Service Motor Truck Co., S. M. Williams of the Garford Motor Truck Co., and A. C. Burch of the Clydesdale Cars Co., representing the truck manufacturers.

This committee has held conference and formulated a statement that has been presented to Chairman Bernard M. Baruch of the War Industries Board, which statement has not been made public. It reflected the conditions which the industry must meet as forecasted by the members of the committee, and the relief that must be assured to protect labor during the adjustment of the different enterprises incidental to resumption of normal production.

From the viewpoint of national economy cancellation of all contracts and termination of, or at least minimizing, expenditure of all kinds would appear to be desirable, but at the other hand the government has compelled the industry to cooperate with it and this has necessitated cessation of normal operations, so

that there is not only the obligation of the government to protect the industry, but the imperative need of protecting labor as well.

The industry can only be assured by the determination of extremely important (to the industry) policies, one of which is the disposal of vehicles now owned by the nation and in war service, which will be in large part unnecessary after the demobilization of the army in this country and the termination of active operations abroad. If the trucks bought for the army are placed in the markets and sold for such prices as may be offered for them, there would undoubtedly be disruption of the industry for a long period of time, because of the uncertainty of demand and the unwillingness of manufacturers to build machines that could not be sold because of the high prices that would be necessitated by war period cost of materials and the wages demanded by labor.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUG. 24, 1912, OF

MOTOR TRUCK,
PUBLISHED MONTHLY AT PAWTUCKET, R. I.
For October 1, 1918.

State of Rhode Island, County of Providence.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared William H. Black, who, having been duly sworn according to law, deposes and says that he is one of the owners of the MOTOR TRUCK, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the act of Aug. 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

PUBLISHER, WM. H. & D. O. BLACK....Pawtucket, R. I.
EDITOR, WM. W. SCOTT.....Pawtucket, R. I.
BUSINESS MANAGER, WM. H. BLACK..Pawtucket, R. I.

2. That the owners are:

WM. H. BLACK.....Pawtucket, R. I.
D. O. BLACK.....Pawtucket, R. I.

3. That the known bondholders, mortgagees and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages or other securities are:

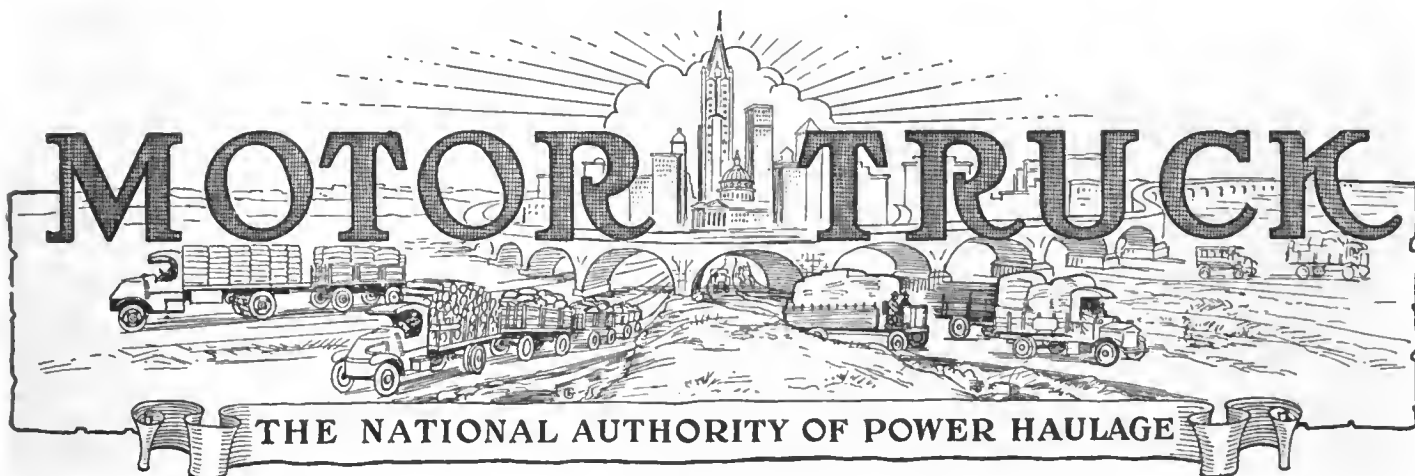
M. J. BLACK, Mortgagee.....Pawtucket, R. I.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

(Signed) WILLIAM H. BLACK, Co-Partner.

Sworn to and subscribed before me this 4th day of October, 1918.

(Signed) THOMAS BESWICK, Notary Public.
[Seal] (My commission expires June 30, 1920.)



Vol. IX. No. 12.

PAWTUCKET, R. I.

DECEMBER, 1918

DRIVERS OWN TRUCK FLEET OF BIG PUBLIC SERVICE COMPANY

Owners' Transportation Co., Inc., Cooperative in Workers Organization and Ownership of Equipment, Operated by Men Who Have Made Rapid Development and Plan for Very Extensive Highway Haulage in 11 States North of Washington and East of Buffalo.

OPERATING a public service across southern New England, between Boston and New York City, the Owners' Transportation Co., Inc., with offices at 1106 Commonwealth avenue, Boston, and 1457 Broadway, New York, is the first concern to undertake highway transportation with power trucks in a large way east of the metropolis. The company did not begin operations until Sept. 1, and then but a single unit was utilized, but in three months it has increased very rapidly and it now has 26 trucks in service. There is seemingly a splendid future for the concern and with the business that has been developed and what is apparently well assured, the expectations of the company for almost unlimited expansion appear to be substantially founded.

The Owners' Transportation Co. differs diametrically in its operating plan as contrasted with the operations of concerns doing highway haulage that operate from a single base in that the purpose is to afford what may be stated as paralleling a general express service, with a scope

covering a considerable area of the country.

The transportation company established in a given commercial center may undertake haulage in every direction, but its trucks must return without cargoes

between stated terminals may have freights in either direction, which would insure a large ratio of revenue from the mileage driven by each unit, but while this may be practically realized there are limitations as compared with the trans-



Typical Standardized Equipment of the Owners' Transportation Co., Inc., a Gram-Bernstein 5-8-Ton Truck with Panel and Crate Sides and Standing Top.

unless through unusual conditions or circumstances returning freights can be obtained, and there is no assurance that more than half the mileage the machines are driven can be made productive.

Freights Must Move Both Ways.

The concern that undertakes haulage

are competing systems. From one point of view competition between transportation companies is destructive, because the chief inducement that can be offered to interest shippers is lower rates, and there is a level or limitation established by the cost of operation of freight between a number or chain of cities, the terminals of the chain being established wherever profitable operation ceases. Logically the greatest and most constant movement of commodities are between places of considerable importance, and when these are surveyed for the purpose of determining the probable tonnage that could be transported, one realizes that the well organized railroad and express services are usually available and the rates are as low as is practical, especially if there

are competing systems. From one point of view competition between transportation companies is destructive, because the chief inducement that can be offered to interest shippers is lower rates, and there is a level or limitation established by the cost of opera-



One of the 5-6-Ton Gramm-Hernstein Trucks of the Owners' Transportation Co., Inc., with Platform Body, the Load Being Covered with Tarpaulin.

tion, for capital must have an adequate return to continue investment unless there is promise of substantial revenue and reasonable profit. There may be possibilities of developing business, but these must be with reference to industrial conditions and progress will necessarily be slow where the volume handled is not large. Small operations do not attract capital, which can seldom be interested in development that must be made in competition with well established enterprises unless there are other or unusual advantages.

Railroads Have Speed.

Generally transportation has been developed by railroad because this, whether classified as freight or express, has been regarded as being the more expeditious. The movement of freight, however, cannot be uniform, not even in a purely industrial section of the country, and the variability of movement depends upon conditions. Because of the uncertainty of delivery of shipments and, to a considerable extent, their character and the need, those given expeditious movement and special attention with reference to delivery have been differentiated as express. Where time is not an essential factor and delivery is not made the shipments have been classified as freight. This distinction is clear enough in the minds of all business men, but the application is usually lost sight of in regard to highway haulage by power vehicle.

Conditions in New England are peculiar in that there are but three railroad systems, the New Haven, Boston & Maine and the Central Vermont (which is operated in connection with the Grand Trunk Railway) and these are not competitive. Until very recently the New Haven and Boston & Maine were operated as a single system. There has been no material construction or expansion of these roads in many years. Their facilities may have been developed with a view of improving terminals and expediting the movement of trains, but these have been more than offset by the increase of freight.

Why There Is Need of Haulage by Highway.

The policy of the New Haven railroad was to insure against competition by acquiring all steam or electric or water lines that existed and might possibly be

developed to proportions. This could be interpreted only as direct monopoly of transportation, and while there was limitation of rates by the Interstate Commerce Commission, there was no way of betterment of service save by increasing trackage and rolling stock, which was not sanctioned by the management because of the need of funds for paying dividends so long as this could be done. When the New Haven railroad collapsed all prospect of improvement vanished and there is no reason to believe that the system will be rehabilitated and be made productive for a long period of time. This statement is necessary to establish why there are unusual possibilities for the service that the Owners' Transportation Co. has been organized to afford.

For a considerable time prior to the war with Germany the New Haven railroad, because of the necessity of rigid economies, reduced its service to the public to what was entirely inadequate as compared with what had been afforded, and congestion of traffic and retardation of shipments increased to a degree that was far worse than existed in any other section of the country.

Growth of Highway Transportation.

New York is the principal shipping port of the nation and the center of commercial distribution, and the inadequacy of railroad service in New England was such that manufacturers and business men were compelled to utilize power

trucks for transportation between New York and various localities. Later on haulage from considerable distances outside of New England was engaged in, and where time was a factor in shipments they were made as far west as Buffalo and as far south as Washington, or 485.9 and 484.4 miles respectively.

Such shipments were at first regarded simply as emergency work, where expense was secondary, but services were soon established between New York City and Philadelphia, Baltimore and Washington which were primarily to afford regular transportation, and the rates exacted were not excessive when the value of time and other factors are considered. The prices for emergency service were high as compared with those charged where transportation was constant, which was consistent enough.

The demand for freight and express service between New York and Washington was very greatly increased directly upon the entry of the United States into the war, but there was more urgent need between New York and Philadelphia, and it was between these two cities that companies first engaged in regular operations. The distance is 106 miles and this can be driven in approximately 10 hours by any driver.

Unique Operating Plan.

The Owners' Transportation Co., Inc., is unique in highway transport at least, and so far as known its make up and plan of operating are entirely different from any now engaged in transportation. So far as the public is concerned the company has practically the status of any other affording a public service. It has the same responsibilities and it has the same safeguards and protection that are afforded by all common carriers. The service is somewhat more elastic and the company will go to greater extremes than railroads and express companies to insure satisfaction, and it will undertake special work to contract.

But the Owners' Transportation Co., Inc., is devoted practically to operating. It controls a fleet of trucks through contract with the owners, and the truck owners, while not stockholders in the company, are engaged in a cooperative work to a plan that insures them a very substantial return on their investment. With



Owners' Transportation Co.'s Truck Enroute from Boston to New York with Cargo of Miscellaneous Freight. This Body Is Designed for Use with Loads of Variable Bulk.



Gram-Bernstein 5-6-Ton Truck Chassis, with Crate Body, at the Boston Office and Service Station at 1106 Commonwealth Avenue.

this fleet the company can undertake any work. It may make contract of any kind, utilizing the trucks as though it owned them. It is in effect a managing company, which first of all develops and secures the business, executes contracts for work, superintends the operations, makes the collections and pays the bills, finances the operations in affording service, furnishes fuel, lubricants, supplies of all kinds, pays the owner and his helper stated amounts weekly, meets the expenses incurred during absences from the base of operations, and guarantees to the owner a stated return for a specific period.

Owners Have No Responsibility.

The owner of the truck is first of all insured work for his machine and he is relieved of all of the responsibility of management. He need not solicit business unless this can be done in connection with work on which he is directly engaged. He need give no attention to contracts, to collections, to finances. He is guarded against neglect of his machine mechanically and encouraged to drive it carefully and to avoid whatever might be a cause of deterioration. In this respect he is really better off than he would be were he to follow his own inclinations, for the depreciation of his property is minimized and he has the added advantage of having what will give what may be regarded as standard service. The condition of the trucks is important to business men because they are protected so far as possible against delays from failure or retardation of transport, and service can be guaranteed to them in practically every instance.

The Owners' Transportation Co. has in this plan a factor that must appeal to business men. They will naturally have greater confidence in a service that is afforded by interested men. The drivers are owners and because of obvious reasons are directly concerned in the work being done satisfactorily. They will hardly abuse their own property when they know that its principal efficiency is dependent upon the care they give it. They will obtain reasonable economies because they will themselves share in whatever savings they can bring about. They will not lose time when this loss affects themselves and their fellows quite

as much as the company. They will not overload, will drive carefully, will use their tires with better judgment, will save fuel and oil and grease, will guard against repair expense, and they will see that adjustments and repairs are made as quickly as is practical after the necessity for them is known.

Drivers Have Investments.

There is another condition that enters into the plan, and that is that the men who own trucks have their own capital invested and want to make it as productive as is possible. They are generally men of intelligence and understand the benefit of cooperation. There is every reason why they should endeavor to make the service of the company satisfactory and successful. Undoubtedly they were convinced of the possibilities of the proposition or they would not have entered into contract, and having in reality the same interest that a stockholder in another form of company has they can be expected to do whatever will enhance the value of their property and their revenue

from it.

The Owners' Transportation Co., Inc., of which M. F. Goodrich of New York City is president, makes contract with men who can produce bank references so that they may participate in the cooperative plan of operations. First of all the company has standardized Gram-Bernstein trucks as equipment, and the men who make contract are required to have trucks of this make and of the sizes specified for the work. As the greater part of the work is heavy haulage, 21 of the fleet of 26 are rated at 5-6-ton load capacity, one is three-ton, two are 2½-ton and two are two-ton. The company will finance his purchase if he can make an initial payment of \$2000, buying the truck outright and placing it at his disposal, arranging the terms of the payments to cover a stated period within a year.

Company Guarantees Returns.

In its contract for service the company will guarantee to the owner constant work, his own wage of \$35 a week, a wage for a helper of \$25 a week, his operating expenses, and a sufficient return to pay a balance of \$4000 on a truck costing \$6000, and \$1500 in money in 12 months. It will give a bond to purchase the truck from him at the expiration of the year for \$3500 provided it has been maintained to the standard required by the company. As will be noted all the financial transactions pass through the operating company, save such incidental expenses as are incurred by the drivers while on the road, for which vouchers are submitted and refunds are made. This insures the same oversight of expenditures that would obtain were the operations to the usual plan.

The general manager of the company is C. H. King, whose office is at 1106 Commonwealth avenue, Boston, who is assisted by H. C. Thanasse as traffic manager. A receiving station is located at this office, and in the same building, which was erected specially for a combination power vehicle salesroom and service station, is



Truck of the Owners' Transportation Co., Inc., Loaded with 34 Bales of Wool, Weighing 12,128 Pounds, Valued at \$50,000, Hauled from Boston to Salamanca, N. Y. The Record Trip Was Made to Buffalo for a Return Freight in Nine Days.

a well equipped shop and a force of men organized so that work may be begun whenever necessary and carried through as expeditiously as practical.

The headquarters of the company is at this location, and from it the operations all over southern New England, New York State as far west as Buffalo, and New Jersey, southeastern Pennsylvania, Delaware, Maryland and the District of Columbia are directed.

Plan of Wide Development.

The plan of the company is to extend its operations and increase its equipment as rapidly as necessary or desirable, and the purpose is to locate truck owners in different parts of the operating territory so that instead of having two bases (as Boston and New York City for instance), there will be as many as may be required along the different routes traversed to afford whatever service may be needed to handle the business.

Primarily the company engages in what may be regarded as long distance haulage, the original service being established between Boston and New York City. This was via Providence, New London and New Haven, and later was varied with Worcester, Springfield and Hartford. The operating plan has been determined very clearly, but the territory operated in has increased so rapidly and so much attention has been given to development of business that the service does not cover all the area contemplated. In fact, a very large number of machines, probably fleets, located in a number of the principal cities, will be necessary to handle the business that is expected to be developed.

Gives Service Along Routes.

The company does not intend to oper-

ate as to the majority of transportation services, between two terminals carrying capacity loads, but to undertake freightage from terminal to terminal or from point to point along the routes. Taking the main routes between Boston and New York, that along the shore of Long Island Sound is known as No. 1, and the other, through Worcester, Springfield and Hartford, that meets No. 1 at New Haven, is known as No. 2. Beyond New York there is one main route across New Jersey to Trenton, thence through Pennsylvania to Philadelphia, and on to Baltimore and Washington.

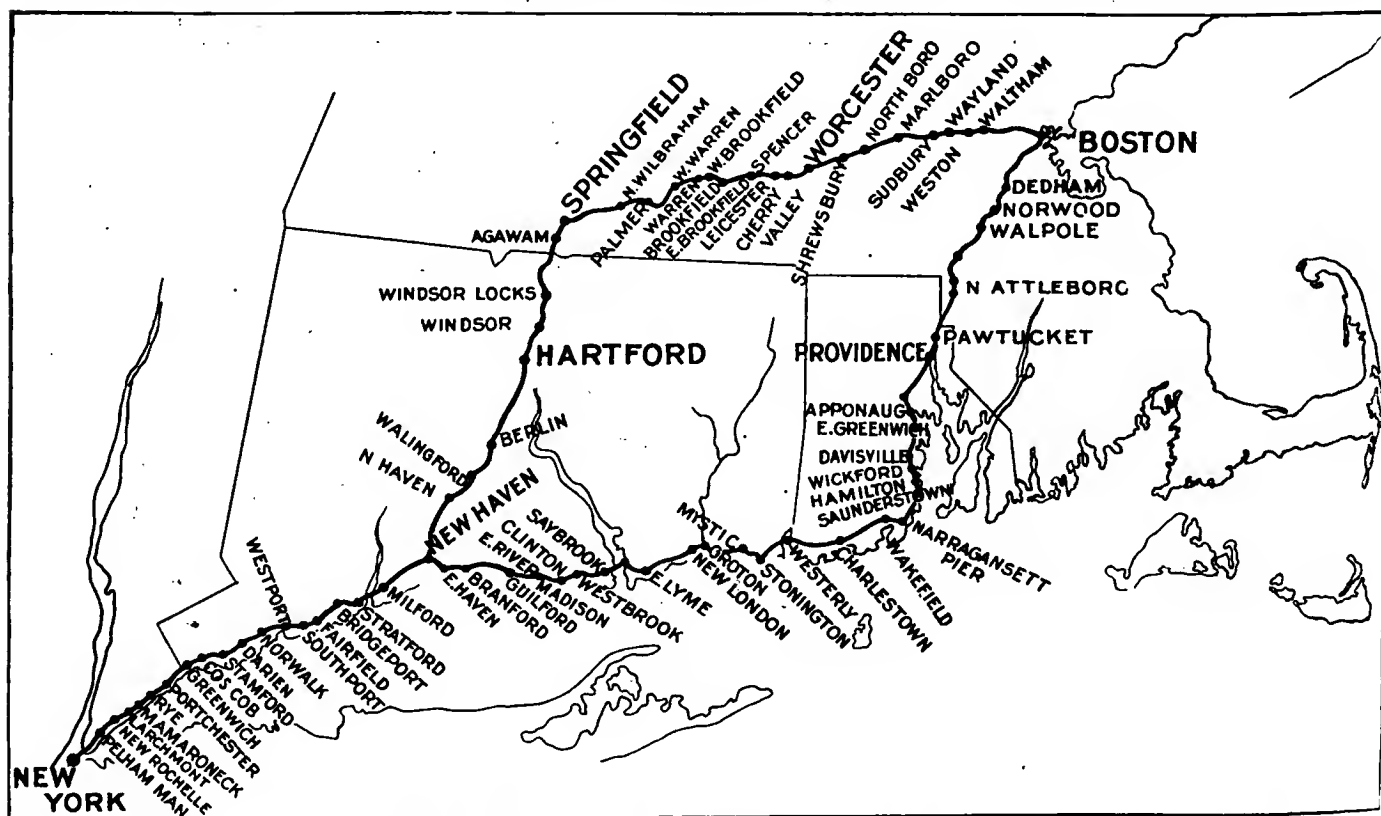
Considering these for a moment. Route No. 1 has five principal stops, at Providence, New London, New Haven, Bridgeport and Stamford, between the two terminals, with 43 intermediate stops between the places specified. Route No. 2 has six principal stops, Worcester, Springfield, Hartford, New Haven, Bridgeport and Stamford, between the terminals, and 40 intermediate stops, a total of 48. These are on the two main lines of New Haven railroad, and the trucks can stop to deliver or collect at any of these or they may, if the freight is of sufficient volume, make deliveries or collections off of these routes to localities that are accessible and which service will not retard the time of the trucks to any material extent. This applies to local freightage, but capacity loads can be delivered wherever required, for these can be handled independently of the trucks affording regular service on these routes.

No better statement of the scope of the service can be given than to show the two main routes, together with the distances, and the rate from the terminals

per 100 pounds, together with the rates and mileages between Boston and Jersey City, Newark, New Brunswick and Trenton, N. J., Philadelphia, Baltimore and Washington.

One will note that the rates on route No. 1, from Boston to New York, there are five zones, with a rate applying to each. The limit of the first zone is Providence, with a rate of 40 cents a 100 pounds, the second is from Apponaug, R. I., to Mystic, Conn., with a rate of 82 cents a 100, the third is from Groton, Conn., to Bridgeport, Conn., with a rate of 99 cents, the fourth is from Fairfield to Noroton, Conn., with a rate of \$1.25, and the fifth is from Stamford to New York, with a rate of \$1.50. Returning from New York to Boston, or east bound, there are four zones, from New York to Norwalk, Conn., with a rate of 66 cents; from Westport, Conn., to East Lyme, with a rate of 99 cents; from New London, Conn., to Providence, with a rate of \$1.10, and from Pawtucket to Boston, with a rate of \$1.50.

On route No. 2 the zone limit stations are Marlboro, with a rate of 40 cents; Northboro to Leicester with a rate of 60 cents; Spencer to Springfield, with a rate of 82 cents; Windsor Locks, Mass., to New Haven, Conn., with a rate of 99 cents, where the route then continues along route No. 1, carrying the 99 cent rate to Stratford, the \$1.25 rate from Bridgeport to Noroton, and the \$1.50 rate from Stamford to New York. Bound eastward the first zone limit is at Norwalk, with a 66 cents rate; the second is New Haven, with an 82 cents rate; the third is North Haven, with a rate of 85 cents; the fourth is Springfield, with a rate of 99 cents; the fifth is Worcester, with a rate



Map of Southern New England, Showing the Main Routes of the Regular Haulage Service of the Owners' Transportation Co. No. 1 Being from Boston to Providence and Along the Shores of Narragansett Bay and Long Island Sound to New York, and No. 2 to Worcester, Springfield and Hartford to New Haven, Where It Continues on Route No. 1.

ROUTE NO. 1 STATIONS.

Miles from Boston	Rates from Boston per 100 lbs.	Boston to	Rates from New York	Miles from New York
10	.40	Dedham, Mass.	1.50	235
14	"	Norwood, Mass.	"	231
18	"	Walpole, Mass.	"	227
31	"	North Attleboro, Mass.	"	214
39	"	Pawtucket, R. I.	"	206
44	"	Providence, R. I.	1.10	201
54	.82	Apponaug, R. I.	"	191
56	"	E. Greenwich, R. I.	"	189
60	"	Davisville, R. I.	"	"
63	"	Wickford, R. I.	"	181
65	"	Hamilton, R. I.	"	180
69	"	Saunderstown, R. I.	"	176
75	"	Narragansett Pier, R. I.	"	170
78	"	Wakefield, R. I.	"	167
87	"	Charlestown, R. I.	"	157
99	"	Westerly, R. I.	"	146
104	"	Stonington, Conn.	"	140
109	"	Mystic, Conn.	"	136
116	.99	Groton, Conn.	"	120
117	"	New London, Conn.	"	129
123	"	E. Lyme, Conn.	.99	121
125	"	Saybrook, Conn.	"	109
140	"	Westbrook, Conn.	"	105
144	"	Clinton, Conn.	"	100
148	"	Madison, Conn.	"	96
151	"	El. River, Conn.	"	94
153	"	Guilford, Conn.	"	91
162	"	Branford, Conn.	"	83
170	"	New Haven, Conn.	"	75
179	"	Milford, Conn.	"	66
182	"	Devon, Conn.	"	63
184	"	Stratford, Conn.	"	61
187	"	Bridgeport, Conn.	"	57
192	"	Fairfield, Conn.	"	52
194	"	Southport, Conn.	"	51
198	"	Westport, Conn.	"	47
201	"	Norwalk, Conn.	.66	44
205	"	Darien, Conn.	"	40
207	"	Noroton, Conn.	"	37
210	1.50	Stamford, Conn.	"	35
213	"	Cos. Cob., Conn.	"	31
215	"	Greenwich, Conn.	"	30
218	"	Portchester, N. Y.	"	27
220	"	Rye, N. Y.	"	25
223	"	Mamaroneck, N. Y.	"	21
225	"	Larchmont, N. Y.	"	20
227	"	New Rochelle, N. Y.	"	18
228	"	Pelham Man., N. Y.	"	16
245	"	New York, N. Y.	"	00

ROUTE NO. 2 STATIONS.

Miles from Boston	Rates from Boston per 100 lbs.	Boston to	Rates from New York	Miles from New York
10	.40	Waltham, Mass.	1.50	221
12	"	Weston, Mass.	"	218
17	"	Wayland, Mass.	"	215
19	"	South Sudbury, Mass.	"	212
27	"	Marlboro, Mass.	"	205
33	.60	Northboro, Mass.	"	199
37	"	Shrewsbury, Mass.	"	194
43	"	Worcester, Mass.	1.10	189
47	"	Cherry Valley, Mass.	"	185
49	"	Lelcester, Mass.	"	182
54	.82	Spencer, Mass.	"	177
58	"	East Brookfield, Mass.	"	174
61	"	Brookfield, Mass.	"	171
63	"	West Brookfield, Mass.	"	168
67	"	Warren, Mass.	"	165
69	"	West Warren, Mass.	"	162
78	"	Palmer, Mass.	"	153
84	"	West Wilbraham, Conn.	"	148
94	"	Springfield, Mass.	.99	138
107	.99	Windsor Locks, Conn.	"	124
113	"	Windsor, Conn.	"	119
119	"	Hartford, Conn.	"	112
130	"	Berlin, Conn.	"	101
137	"	Meriden, Conn.	"	95
143	"	Wallingford, Conn.	"	88
148	"	North Haven, Conn.	.85	83
		New Haven, Conn.	.82	"
	1.60	Jersey City, N. J.	"	"
	1.75	Newark, N. J.	"	"
	2.00	New Brunswick, N. J.	"	"
	2.25	Trenton, N. J.	"	"
	2.50	Philadelphia, Pa.	"	"
	3.60	Baltimore, Md.	"	"
	4.00	Washington, D. C.	"	"

NOTICE.

Note.—These prices are based on solid weight, subject to our option; light weight material scaled at 20 cents per cubic foot, also based on direct main line route of terminals as shown on tariff card.

New York City delivery includes only Manhattan to 59th street, 10 per cent. charges between 59th and Battery additional. Brooklyn, Bronx and Long Island charges will be 20 per cent. additional of total, on account of waiting and congestion.

All freight from New York to and from Newark and Jersey City 25 per cent. will be charged on account of the ferry and waiting time.

No shipments accepted less than \$1.

of \$1.10, and the sixth, between Shrewsbury and Boston, is \$1.50.

Considering these rates further, and by ton and capacity loads, the tariffs show the following:

Route No. 1, West Bound.

Zone	Rate a Ton	Rate a Load
No. 1.....	\$8.00.....	\$48.00
No. 2.....	16.40.....	98.40
No. 3.....	19.80.....	118.80
No. 4.....	25.00.....	150.00
No. 5.....	30.00.....	180.00

Route No. 1, East Bound.

Zone	Rate a Ton	Rate a Load
No. 1.....	\$13.20.....	\$79.00
No. 2.....	19.80.....	118.80
No. 3.....	22.00.....	132.00
No. 4.....	30.00.....	180.00

Route No. 2, West Bound.

Zone	Rate a Ton	Rate a Load
No. 1.....	\$8.00.....	\$48.00
No. 2.....	12.00.....	72.00
No. 3.....	16.40.....	98.40
No. 4.....	19.80.....	118.80
No. 5.....	25.00.....	150.00
No. 6.....	30.00.....	180.00

Route No. 2, East Bound.

Zone	Rate a Ton	Rate a Load
No. 1.....	\$13.20.....	\$79.20
No. 2.....	16.40.....	98.40
No. 3.....	17.00.....	102.00
No. 4.....	19.80.....	118.80
No. 5.....	22.00.....	132.00
No. 6.....	30.00.....	180.00

Beyond New York, South end.

Destination	Rate a Ton	Rate a Load
Jersey City.....	\$32.00.....	\$192.00
Newark, N. J.....	35.00.....	210.00
New Brunswick, N. J.....	40.00.....	240.00
Trenton, N. J.....	45.00.....	270.00
Philadelphia.....	50.00.....	300.00
Baltimore.....	72.00.....	432.00
Washington.....	80.00.....	480.00

Washington to New York and Boston.

Destination	Rate a Ton	Rate a Load
Baltimore.....	\$8.00.....	\$48.00
Philadelphia.....	30.00.....	180.00
Trenton.....	35.00.....	210.00
New Brunswick.....	40.00.....	240.00
Newark.....	45.00.....	270.00
Jersey City.....	48.00.....	288.00
New York.....	50.00.....	300.00
Norwalk, Conn.....	63.20.....	379.20
East Lyme, Conn.....	69.80.....	418.80
Providence.....	72.00.....	432.00
Boston.....	80.00.....	480.00

Route No. 1 and its continuance to Washington has the following mileages according to officially measured distances. From Boston the principal commercial centers are:

Name	Distance	Miles To
Providence.....	44.2.....	44.2
New London.....	118.7.....	74.5
New Haven.....	171.5.....	52.8
New York.....	246.5.....	75.0
Newark.....	257.1.....	10.6
Trenton.....	312.3.....	55.2
Philadelphia.....	352.5.....	40.2
Baltimore.....	446.5.....	94.0
Washington.....	484.4.....	37.9

The distances by route No. 2 and its continuance to Washington has the following mileages, the principal commercial centers from Boston being:

Name	Distance	Miles To
Worcester.....	43.4.....	43.4
Springfield.....	94.4.....	51.0
Hartford.....	121.7.....	27.3
New Haven.....	158.8.....	37.1
Bridgeport.....	176.4.....	17.6
New York.....	233.8.....	57.4
Jersey City.....	.....	.....
Newark.....	244.4.....	10.6
Trenton.....	299.6.....	55.2
Philadelphia.....	339.8.....	40.2
Baltimore.....	433.8.....	94.0
Washington.....	471.7.....	37.9

These two routes and their continuations south are merely the skeleton or backbone of the transportation system that is planned, and to afford service to three Connecticut cities that are not touched by them the purpose is to diverge from route No. 2 at Hartford when west bound, continuing on to New York through Waterbury and Danbury, and when east bound to go to these cities and meet the present No. 2 route at Hartford. This would afford a slightly increased mileage, as follows:

(Continued on Page 469.)

CAN USE 100,000 TRACTORS IN STATE OF OHIO.

Prof. H. C. Ramsower of the departmental engineering of the State University of Ohio is authority for the statement that 100,000 tractors is the potential demand of the State of Ohio for carrying on its farming operations, 20,000 of which should haul three plows and 80,000 two plows. Yet there is now in operation in the state only about 5000 machines. This was made at the third annual convention of the implement dealers of Ohio and was intended to show the marketing possibilities of the state for tractors and implements. A good deal of the time of the convention was given over to consideration of tractors, tractor service, service repairs, general repairs, use of power implements, etc.

The association elected these officers to serve for the year to come: President, S. M. Sellers; first vice president, C. A. White; second vice president, E. H. Huffman; third vice president, H. C. Otterbacher; treasurer, M. J. Shank; directors for three years, William Fisher and Charles Martens.

BORG & BECK ACQUIRE THIRD PLANT SITE.

The Borg & Beck Co., East Moline, Ill., manufacturer of clutches, which also operated a plant at Galesburg, Ill., has acquired the Chicago property occupied by the Smith Motor Truck Corporation, which was recently sold at receiver's sale. The land is 3.1 acres area and the building was erected in 1916 by the Clearing Industrial Association. The Borg & Beck Co. now produces 10,000 clutches a month, but when the new plant is operating the purpose is to turn out 3000 clutch units a day, or approximately 75,000 a month.

The J. E. F. Spark Plug Co., Milwaukee, Wis., which makes a new type spark plug, is to move into new quarters and add new types of plugs and increase its production of all of the series.

Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis., has appointed Homer Hilton its advertising manager.

Canadian Soldiers Trained to Farm Tractor Work.

Because of its longer experience with results of the war and the realization that upon their return from the battlefields of Europe reasonably lucrative occupations must be found for its soldiers, the Canadian government a considerable time ago undertook to train men who were physically incapacitated from resuming their former work. The government had no definite knowledge of the number of citizens who might be in need of assistance in finding employment. Obviously many thousand men would return who might consistently make demand upon the state for partial support, who would be unable to earn the same wages because of disabilities, and who were entitled to consideration.

The practicality of a plan of training these men to new work, which would make them wholly or partly self-sustaining was indorsed, and this resulted in the establishment in several places of what are known as vocational re-education schools, where the soldiers are systematically trained for such work as they can best do, according to their physical condition. One of these schools is at Toronto, Ont., and with the belief that many men will avail themselves of grants of farms, one department is devoted to teaching all soldiers who may desire to engage in farming whatever will be for their advantage to learn.

At the Toronto school the department given over to training agricultural workers has been equipped with farm tractors and various machines and power implements, and the soldiers are taught to understand them mechanically, to drive, adjust and repair them, and are given comprehensive courses in theory as well as practical work. This tuition is intended to fit these men to earn good wages, to place them where they can be as independent as is possible for rehabilitated men to be, and to so qualify them that their services will be in demand.

Men who have suffered the loss of a leg, an arm, or an eye, or are otherwise crippled, are trained so that they can, by

their own exertions, be beyond want, for there is dependence in the loyalty of Canadian farmers to employ these men so far as is possible. The men with rare exceptions become remarkably proficient, even when using artificial limbs.

The tractors and other machines are adapted so that they can be handled to full productiveness, and there is reason to believe that thousands of men who have suffered physical loss will be able to maintain themselves independently through the training afforded by these schools. And very largely the knowledge of tractors will be the mainstay of these men through life. Incidentally, the schools are equipped with American machines and the knowledge these men possess will undoubtedly create a still greater demand for tractors built in the United States in Canada.

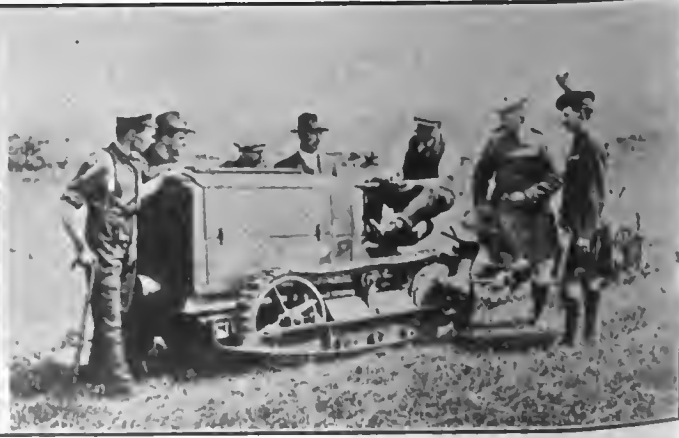
SQUARE TURN TRACTOR MOVES TO OMAHA.

The Square Turn Tractor Co., which has since its organization maintained its executive offices in Chicago, has removed them to Omaha, Neb., this being desirable from the fact that a contract for tractors of considerable proportions is now being filled by the Omaha Structural Steel Works. At a meeting of the board of directors Walter S. Jardine was elected chairman, and he will be the executive head of the concern. The main factory of the company is located at Norfolk, Neb.

WILL DISTRIBUTE LAUSON TRACTORS.

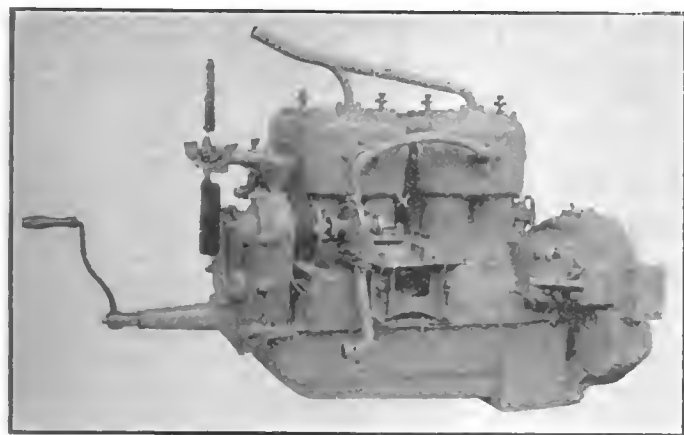
Soderberg Brothers, dealers in automobile vehicles and implements at Calva, Ill., has made contract to distribute Lauson tractors in Henderson, Stark, Warren, Mercer, Galleshurg, the southern half of Henry and the western half of Bureau counties in that state. The company dealt in Lauson tractors with an agency contractor and upon making the new contract ordered 50 machines.

The price of Fulton trucks has been reduced from \$2000 to \$1850 by the Fulton Motor Truck Co., Farmingdale, L. I. The company makes but one size truck and now plans to increase its production.



Canadian Veteran Soldiers, Physically Unfitted for Former Occupations, Training at the Vocational Re-Educational School at Toronto, Ont., to Drive Tractors—The Man Who Is Shown at the Left Has an Artificial Leg, but Is Extremely Efficient Despite This.

TWO RUTENBER TRUCK ENGINES



Left Side of Rutember "38" and "40" Tractor Engine Assembled with Detachable Flywheel Housing for Use in Unit Power Plant.

TWO sizes of engines are specialized by the Rutember Motor Co., Marion, Ind., known as models 38 and 40, which are designed for farm tractor and truck construction. The two are built to the same design and there is practically no difference in the machines aside from piston displacement and cylinder bore. They are both rated by the manufacturer as 45-50 horsepower, which specifies the maximum horsepower that may be relied upon. The following presents the principal differences in the two machines:

	Bore In.	Stroke In.	Piston Disp. Cu. In.	S. A. E. Rating	Brake H. P. 1000 R. P. M.	Brake H. P. 1500 R. P. M.	Brake H. P. 2000 R. P. M.
Model 38	4 1/4	5 1/4	294	27.25	31	43	48
Model 40	4 1/2	5 1/4	330	30.62	34	47	52

The Rutember company is one of the oldest concerns in the country exclusively producing engines. Its products have for years been used by vehicle manufacturers and are recognized throughout the industry as standard. Rutember engines have been designed for stationary and power vehicle service and may be said to be representative of prevailing practise. The policy of the company has been to very carefully determine a design and when its qualities have been determined by service experience to continue the design so long as was practically possible, making consistent changes whenever these had been proven desirable or essential. Rutember engines have been built with every care to obtain simplification and accessibility. High efficiency from a given volume of fuel has been sought and endurance, that the cost of upkeep may be minimized, has been regarded of prime importance.

Two Models Carefully Developed.
The two models which are the subject of this article are not new in the sense of being recent productions. They have been built for approximately four years and during that period have been carefully developed, so that statement that they have been thoroughly service proven is abundantly justified. The engines have been perfected with reference to obtain-

ing thorough efficiency and operating economies, and from every point of view may be relied upon as sufficient for every service for which they are recommended by the manufacturer.

The engines are primarily intended for consuming gasoline and are the conventional four-cylinder, four-cycle, water cooled, vertical, L head type. They are so constructed that they may be installed independently of the transmission gearset, or combined with it and the clutch into unit power plants when such combination is desirable.

The main difference in the two engines has been stated and the following description, even to dimensions, will apply equally well to either.

Cylinders Cast in Pairs.

The cylinder units are cast in pairs with the water jackets integral, the water chambers being unusually large, the heads of the units above the combustion chambers of the cylinders being open. The base flanges are exceptionally heavy and webs from these flanges, under the valve pockets, form seats for the plates that enclose the valve mechanism. The castings are so formed that the cylinder and water jacket walls may be made exceedingly uniform, this insuring adequate cooling and lubricating efficiency, and the water chambers can be completely cleared so that there is certain freedom of circulation. The heads of the water jackets are closed with large plates retained by screws, in the centers of which are the outlets that connect with the main manifold.

The cylinder castings are a close grained gray iron and after machining and rough boring they are tested by hydraulic pressure to detect leaks and defects. The castings are aged for considerable periods and are finished by grinding the bores. The pistons are cast from the same grade of iron as the cylinders and are made as light as is possible. They are turned, annealed and finished by grinding, and the insides of the barrels are bored to make each unit a given weight. Each piston is grooved for three eccentric compression rings, placed above the wristpins, and these are ground

on the faces and edges and are fitted into the grooves with much care.

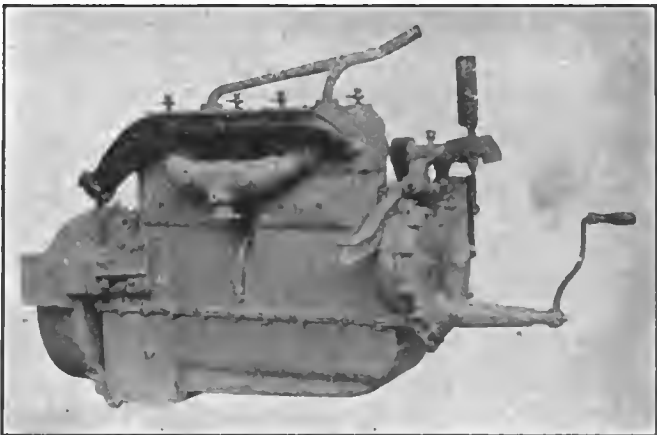
Crank Cases Are Cast Iron.

The crank cases are cast from high quality gray iron in two sections, both of which are reinforced with ribs to obtain maximum strength with minimum weight. The upper section is formed with a central vertical transverse web that carries the middle bearing for the crankshaft, and there is a forward extension that forms a housing for the timing gearset and a rear extension to which the bell housing for the flywheel, when assembled as a unit power plant, is bolted. This housing is detachable and when the engine is for a unit power plant the rear support arms are formed integral with the bell housing. When used independently the support arms are separate brackets that are bolted to the upper section of the crank case.

The lower section is the base of the crank chamber, with an oil reservoir at the rear end. This reservoir has capacity for 2 1/2 gallons of lubricant. There is a forward extension of this section that forms a part of the timing gearset housing, and when intended for a unit power plant there is a rear extension to which the lower part of the flywheel housing is bolted. The two crank case sections are assembled with a series of bolts, and when these are removed the lower part may be removed so that the main and connecting rod bearings may be inspected or adjusted. Provision is made for draining the reservoir by removing a base plug.

Crankshaft and Reciprocity Parts.

The crankshaft is drop forged from a high grade open hearth carbon steel, and it is a three-journal type. The shaft is 2 1/8 inches diameter and the journals from front to rear are 3 1/2, three and 4 1/2 inches length, with a total length of 11 inches. The shafts are heat treated and ground, and much care is taken to balance them, that there shall be minimum vibration from operation. The camshaft is drop forged from open hearth carbon steel with the cams integral, and this is also a three-journal type, 1 1/4 inches diameter. The bearings of this shaft from front to rear are 2 11/32 inches diameter



Right or Valve Side of the Rutember "38" and "40" Tractor Engine, Showing the Yoke for the Support of the Unit at the Forward End and the Large Intake and Exhaust Manifolds.

and 3 9/16 inches length, 2 5/16 inches diameter and 2 1/2 inches length, and 1 1/2 inches diameter and 1 9/16 inches length. The shafts are rough machined, case hardened and finished by grinding, great care being taken to obtain accuracy of cam contour. The shaft is so designed that it may be withdrawn by removing the cover of the timing gearset housing.

The timing gears are large, with 1 1/2 inch faces, and are helically cut to obtain noiseless operation. Much care is taken to maintain the gear centers accurately and have true alignment. The connecting rods are I section carbon open heart steel drop forgings that are heat treated to secure strength. The wristpins are steel tube, case hardened and ground, these being secured in the piston bosses by set screws and cotter pins, the small ends of the connecting rods oscillating on the pins.

All Bearings Are Large.

All the main, crankpin and camshaft bearings are large and of the best quality of babbit metal, the main and crankpin bearings being adjustable with shims in the event of wear. The small ends of the connecting rods are bushed with bronze. The valve ports are 1 1/4 inches diameter and the valve diameter is 2 1/16 inches. The valve lift is 9/32 inch. The valves are cast iron heads electrically welded to carbon steel stems and operate in long guides. The valve tappets are a mushroom type that are fitted in renewable guides and are equipped with adjusting screws and lock nuts. The tappets are hardened and ground to size.

The engines are cooled by centrifugal pumps with bronze vanes, that force circulations of water through the cylinder jackets. The pumps are in line with the magnetos and are driven by idler gears from the crankshafts. The engine lubricating system is full pressure, the oil being drawn through a screen at the intake of the gear pump in the well in the reservoir, and delivered under pressure of from 15 to 20 pounds a square inch to the main, crankpin and camshaft bearings, and the cylinder and piston walls, wristpins, cams and valve tappets are lubricated by the spray thrown by the centrifugal movement of the crankpins and connecting rods. The drainage from the base of the crank chamber returns to the oil reservoir for recirculation. The oil pump is driven from the rear end of the camshaft. The oil pump driving shaft is extended vertically and the drive is taken through a pair of beveled gears. These are connected by flexible shaft to the governor, which is located directly on the intake manifold.

The radiation of the cooling system is promoted by a four-bladed, 18-inch pressed steel fan, which is mounted on ball bearings of the cup and cone adjustable type, and on a bracket carried on the housing of the timing gearset that is automatically adjusting to compensate belt stretch.

The engines are designed to be mounted on three points, the forward support being an I section beam cast from electric steel, fulcrumed on a yoke on the center of the case, with a hardened steel pin. The width and drop may be varied. The width and drop of the detachable rear support arms may also be varied to meet

the requirements of the buyers. The engines are fitted with magneto seats for standard types, and the usual couplings. The carburetor flange is for a 1 1/4-inch vertical instrument.

WILL EXHIBIT TRACTORS AT DETROIT SHOW.

What is expected to be the largest exhibition of the kind ever held by the Detroit Automobile Dealers' Association will take place in Detroit in January or February, and an added attraction will be a tractor department, which is expected to draw visitors from a very large radius who might not be specially interested in either cars or trucks.

All Detroit shows have been of large proportions, and at them both cars and trucks have been shown. The coming show will be the first that has ever admitted farm tractors and made preparations to specialize them. The show will be under the management of H. H. Shuart.

There is more or less speculation as to the advisability of showing tractors in an exhibition of cars and trucks, because there is belief that the tractor men will want to have the undivided attention of visitors, while there may be more or less obstruction of real business through the inquiries of thousands who have no object other than to satisfy curiosity.

The supposition on the part of the automobile vehicle dealers that the addition of tractors to a show would increase the attendance is well founded, and from the viewpoint of increasing the receipts the proposition has much to recommend it.

CONSTRUCTION RESUMED ON GMC FOUNDRY.

Work has been resumed on the big foundry plant at Saginaw, Mich., which was started by the General Motors Corporation, and suspended by order of the War Industries Board. The intention is to have the buildings completed as rapidly as is possible. The foundry is contiguous to the tractor works of the General Motors Corporation, and parts for tractors will be produced in large numbers. Statement is made that the foundry will employ 800 men when it is operated to capacity.

TO TURN FROM TRACTORS TO PASSENGER CARS.

The Candler Motor Co., Cleveland, O., is making preparations to resume the building of passenger cars after completing a very large order for tracklaying type tractors for the War Department. The statement is made that the earning on this contract will reach \$10,000,000 for the year. The company built 15,000 cars in 1917 and it plans to turn out 11,000 in 1918.

The Lieberman & Gittlen Metal Co. has been organized at Grand Rapids, Mich., with capital of \$25,000. The stockholders are Ben Lieberman, Alexander Gittlen and Blar Crohan.

MICHIGAN IS LEADING STATE BUILDING TRACTORS.

Michigan claims to be the leading state engaged in the manufacture of farm tractors—at least in number of machines built, and this is due no doubt to the fact that Henry Ford & Son are producing machines in very large numbers at the big works at Dearborn. There are numerous concerns in Michigan building tractors, but aside from the Ford plant there is as yet no very large company engaged in the industry, although General Motors Corporation is making preparations to build the Samson-Sieve Grip tractor in volume at Pontiac and Saginaw. Neither of these plants have as yet begun to produce in anything like the numbers that is planned when operating to capacity.

A considerable number of concerns of large proportions are located in Illinois and there is a greater number in Minneapolis and St. Paul than in any other one locality in the Northwest. In fact, Minneapolis may be said to be the largest city in point of active industrial concerns. Indiana, Ohio, Iowa, Kansas, Oklahoma and Missouri also have good representation in the industry, for there is seemingly belief that there is a better market in the West than elsewhere in the nation, and production where the shipping distances are minimum compensates very largely for the longer haulage of raw materials.

There are very few tractor builders in the Atlantic coast states, although extreme easterly location would be very desirable for those engaged in exporting on a large scale. With the existing freight rates long railroad hauls will add considerably to production cost, and with a view of obviating baulage so far as is possible Ford & Son propose to have plants in different sections of the country.

While automobile manufacturers have not generally engaged in tractor building, Henry Ford & Son, the General Motors Corporation, the Maxwell Motors Co., the Willys-Overland Co. (through the control of the Moline Plow Co.) and other concerns of lesser importance will produce a large part of the output of the industry when they are operating to capacity.

Some idea of the possibilities may be realized from the statement that the planned output of Henry Ford & Son is 200 machines a day, and that the Moline Plow Co., which is now building 50 tractors daily, will increase this to 100 a day in two months, and to 150 a day by July 1 of next year.

REYNOLDS IS MADE MANAGER.

L. C. Reynolds, who was for a considerable period connected with the Oakland Motor Car Co. and located at Pontiac, Mich., has been made manager of the engine building plant of the General Motors Corporation at Detroit.

An issue of \$600,000 six per cent. cumulative preferred stock has been authorized by the Auto Body Co., Lansing, Mich., of which \$500,000 will be issued at once.

OPERATE TRUCKS WITH RAILROADS

Citizens' Transportation Co., Philadelphia, Has Plan of Cooperation, Not Competition, with Rail and Water Lines and Has Developed Service, Covering Local and Inter-State Field, with Large Fleet—Has Exceptional Facilities for Handling Freight.

ABLE to control in an emergency as many as 100 motor trucks, the Citizens' Transportation Co., Inc., of which Theo. Gabrylewitz is the head, conducts a notably successful inter and intra-city drayage, transfer and express business radiating from terminals in Philadelphia, Chester, Pa., and New York. Efficient pickup and delivery service at these points is a strong factor in the company's successful operation and the size of the fleet—20 trucks being used ordinarily in inter-city hauling, with 15 for local expressing and from five to 10 in its varied work—insures an adequate reserve to take care of the peak loads, as well as the normal daily tonnage.

The local systems operate from spacious receiving and distributing platforms, through which connections are made with the company's fleet of big trucks for the inter-city hauls.

A new feature, at least for this section of the country, is the inception of arrangements whereby both the local delivery and the inter-city services will be operated in connection with rail and water carriers, with special attention—a lesson learned during the war—to overcoming possible blockades and embargoes on the rail lines.

Mr. Gabrylewitz for 35 years has been engaged in a general local teaming and hauling business. Until five years ago he had used animal teams only, covering the city with carefully routed pickup and delivery service. Then as motorized equipment began more insistently to push its way into his territory he found that the horse drawn vehicles were too slow to keep pace with competition, except work at extremely congested terminals, where speed was not such a factor anyway, and for pickup and delivery in over-crowded districts. Accordingly the gradual motorization of his service was begun. It produced such a salutary effect that the process has continued with the greatly expanding business and while 10 horse teams are retained—and probably will be for some time, for the congested traffic as already mentioned, the local and inter-city equipment of motor trucks will be considerably augmented.

The problems of his business have not been taken up solely from a narrow, local viewpoint. Mr. Gabrylewitz has been secretary of the National Team Owners' Association, which is as interested in hauling by motor truck as by horses, in spite of its name, and in his part in conducting the association's affairs he has watched all phases of the transportation business closely and has endeavored to improve conditions permitting greater motorization of service in the larger cities and towns. But he also has been secretary of the Philadelphia Team Owners' Association and is thoroughly familiar and in touch with local problems.

Service Based on Experience.

Applying such unusually favorable experience to his own affairs, superior service is rendered through the combination of an exhaustive knowledge of general

is to furnish a comprehensive service, capable of dealing successfully with every transportation problem presented. Mr. Gabrylewitz's experience as a business man has shown him that where competition is keen, as it is in Philadelphia, accentuating service and conscientiously living up to every point thus made is a great aid to getting and retaining custom.

Has Warehouse and Receiving Stations.

The Citizens' Transportation Co., Inc., has its headquarters and general office at 31 North Sixth street, Philadelphia, in connection with which is a receiving station for the lighter parcels only. The warehouse and receiving station proper is a large, three-story brick building at Delaware and Fairmount avenues—a most advantageous shipping center in the heart of the big warehouse district. Al-

though there is more than 5000 square feet of area on each of the three floors, the business is so rapidly outgrowing its storage facilities that plans already are being considered for a larger terminal.

The office at Chester, in the Crozier building, is chiefly for the direction of the trucks. The office and receiving station in New York is at 381 Broadway.

The character of business transacted by the company, for

convenience sake, may be classified in a general way as:

Inter-city trucking.

Local expressing.

Distributing and forwarding consolidated car load shipments.

Special contract and construction work.

With regard to the latter phase of the business it has been found convenient, when "regular" shipments have been all but impossible, to have merchandise sent by consolidated cars and distributed by motor trucks. This has been developed to a large extent during the railroad freight congestion. Through the receipt of such shipments and distribution of the goods the company has been able to give manufacturers and dealers in other cities a local delivery service on the same basis as Philadelphia's.



One of the Five-Ton Pierce-Arrow Chassis, Equipped with Van Body, a Type Used for the Movement of Packages and Handling Meats and Provisions.

hauling conditions governing movements of both package freight and general merchandise, and of extensive information of organization and operation of large motor truck units in various kinds of work.

Mr. Gabrylewitz is fortunate, too, in that the traffic department is under the supervision of a manager with years of experience in all forms of transportation. This permits the intelligent study of individual transportation problems to give "exact" service to customers, and the advertisement of this fact has proved an asset. Patrons not only get more satisfaction in results, but feel more confident while goods are in transit, if they know that a hauling company has its particular interests at heart, instead of just hauling merchandise and "getting away with it."

In all arrangements with customers, or prospects, the fact is stressed that the policy on which the company is founded

Affords a "Store Door" Delivery.

In other words it has supplied them with a "store door" delivery service. The meeting of these needs in a prompt and novel manner has done much to clinch

illaries on short hauls and for pickup work in congested districts and at overcrowded terminals, various types of wagons are used, the maximum capacity being two tons.



A Five-Ton Peerless Truck with a Platform Body and Rack Sides, That Is Found Very Advantageous for General Purposes, for Practically Any Load Can Be Hauled.

the custom already obtained by the Citizens' company and to spread broadcast the story of its enterprise and practical service to patrons. It was something new—this cooperation with the railroad, water and express lines, instead of fighting them, and as one shipper has said of it, "it's like the case of the barber who nowadays is sensible enough to make a point of sharpening the increasingly popular safety razor and thus getting some of the business while it is going, instead of combating it." The one difference, however, is that the motor truck and not the rail, water and express lines is the increasingly popular means of transportation. However, by "going with" them in a policy of non-resistance up to a certain point, like the Japanese exponent of jiu-jitsu, the company certainly gets business which otherwise might be passed by altogether.

This might prove a valuable tip to some truck transportation services which are spending much energy and advertising space by "knocking" rail, express and steamship lines.

Summed up, the company makes money by using its units in combination, not in competition, with the units of what have largely heretofore been regarded by inter-city hauling concerns as their greatest competitors. Result—their patrons receive an important new accommodation and the money flows in for this service.

Truck Equipment Not Standardized.

The types of motor trucks used by the company are:

Five-ton Pierce-Arrow vans for inter-city package freight movements and for hauling meat and general provisions.

Five-ton slat-side Peerless trucks for the usual tonnage freight.

Five-ton Riker stake body trucks for general hauling.

Two-ton Autocars with express body, for pickup work and local expressing.

Pierce-Arrow, Peerless and Riker dump bodies for contract work.

Leased winch equipped trucks of various kinds.

With the 10 horse teams used as aux-

Like most Philadelphia hauling concerns the Citizens' company favors five-ton units for long hauls.

The contract and construction work is more of an occasional nature with this company than the other phases of its business.

While more van and stake body trucks are in use at the present time, it is the intention of the company ultimately to acquire more of the slat-sided body equipment for its five-ton trucks, like that of trucks now used, as being more suited to the general needs of the business than the ordinary stake body. Probably the number of large van bodies, which may be loaded from either side or rear and have double doors, made partly of steel, will be added within a short period. For inter-city package freight hauling, where the goods are valuable or easily damaged, this type of body is said to be the most satisfactory. For mill hauling the slat-side bodies are favored.

Trucks Are Not Overloaded.

While the company's traffic department

a chassis is huckled—to occasionally load more than the rated limit on the two-ton Autocars thus far has not been visibly destructive.

The company has no garage of its own, but much care is taken in the maintenance of the trucks. Only expert drivers are employed. It is pointed out that in wet and slippery roadways the driving of a heavy, loaded van, especially around turns, requires more skill than is generally believed. Certain competitors have had many accidents and overturning mishaps, when labor was hard to obtain and retain at the average driver's wages, so that the necessity for keeping good chauffeurs contented with their work is recognized.

On the larger type of trucks, especially the inter-city units, each driver has at least one helper on his car, but on local expressing a helper is not always necessary. Here again the employment of active, efficient drivers who have the interests of the business at heart has proved to be an asset. The appearance of the trucks on the road, especially the big vans, is striking. They are battleship gray with black trim.

As the distances the trucks are driven without reaching a terminal is not great—the Philadelphia-New York run is easily made in 10 hours—there is no necessity for two drivers and a helper, or a "Pullman" berth in the vans for sleeping quarters, as are provided by some concerns operating trucks covering a greater distance. As regards the local routing the schedule, of course, has to be flexible to provide for each day's tonnage, and the places of call vary widely.

Has Regular Scheduled Service.

Regular scheduled service is operated between Philadelphia, Chester and New York City, with connections to New England points and extensions to Upland, Lenni, Lansdowne, Media, West Chester and other Delaware county (Pennsylvania) points.

For special accommodation of shippers trucks of almost any desired capacity are furnished for the varied movements of

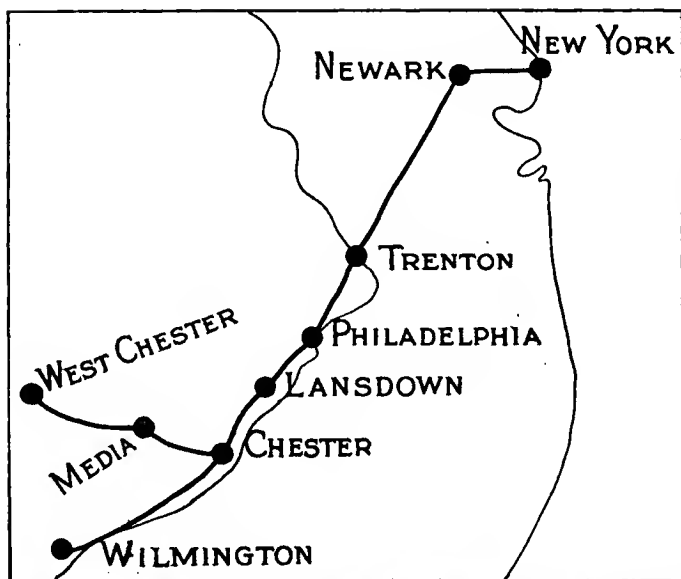


At the Loading Platform. Making Up Loads for the Morning Work: The Trucks Are a Peerless with a Crate Body, a Riker with a Stake Body and a Pierce-Arrow with a Van Body.

deems it unwise to overload any truck—as once a chassis frame is distorted the tires may wear unequally until the frame has been restored to truth, and control is always more difficult for the driver when

tonnage, or package freight, to any stipulated points.

The company also has available for special work, portable hoisting machinery, power winches and other equipment for



Map of the Territory Covered by the Service of the Citizens' Transportation Co., indicating the Terminals and Intermediate Points.

loading and unloading the heavier kinds of machinery and merchandise and trailer units when these are needed.

Rates have been established and are maintained on what is considered the most equitable basis consistent with the cost of movement and the maintenance of warehouses and facilities on a high plane.

And with regard to warehouses: The main one, at Delaware and Fairmount avenues, is a model as to its interior facilities as compared with many such terminals in this city and outside. Not only are the walls painted white, but there is abundant artificial light in addition to the natural lighting of windows and doorways. The arrangement about the platform is most orderly—no helter-skelter of the ordinary "parcel-smashing" type. Upon the walls are painted in black letters several feet high the various destinations, and under each the freight intended therefor is assembled. There is always a thorough understanding with the customer as to rates.

Three Scales of Rates.

The rates are based on a maximum liability of \$50 per shipment, unless greater value is declared and charges thereon paid. The three scales in operation are as follows:

No. 1 Scale—Between Philadelphia and New York: (a) Minimum charge per shipment, \$1. (b) Weight rate per 100 pounds. All shipments weighing over 20 pounds, per cubic foot, \$1. (c) Space rate per cubic foot. All shipments weighing less than 20 pounds, per cubic foot, 15 cents. (d) Special rate, machinery. Single pieces weighing 500 pounds, or over, \$1.50.

Between Philadelphia and Lenni: (As above). (a) 75 cents. (b) 45 cents. (c) 6 cents. (d) 65 cents.

Between Philadelphia and Upland: (a) 60 cents. (b) 35 cents. (c) 5 cents. (d) 50 cents.

Between Philadelphia and Lansdowne: (a) 50 cents. (b) 20 cents. (c) 2 cents. (d) 30 cents.

No. 2 Scale—Between Chester and Phil-

(d) \$2.10.

Between New York and Upland: (a) \$1.50. (b) \$1.30. (c) 17 cents. (d) \$1.88.

Between New York and Lansdowne: (a) \$1.15. (b) \$1.05. (c) 16 cents. (d) \$1.58.

The Detail of Service Charges.

No charge is made for collection or delivery on shipments of 1000 pounds or over in what is known as the Chester district, which includes Marcus Hook, Chester and Eddystone, for one pickup or one delivery, and all shipments less than 1000 pounds cost 10 cents in addition to the foregoing rates. Local package shipments within Chester proper draw a charge of 15 cents per 100 pounds, with a minimum charge of 25 cents, and local package shipments beyond Chester

Philadelphia: (a) 50 cents. (b) 25 cents. (c) 4 cents. (d) 35 cents.

Between Chester and New York: (a) \$1.20. (b) \$1.20. (c) 15 cents. (d) \$1.80.

Between Chester and Lenni: (a) 50 cents. (b) 25 cents. (c) 3 cents. (d) 30 cents.

Between Chester and Upland: (a) 50 cents. (b) 20 cents. (c) 2 cents. (d) 25 cents.

Between Chester and Lansdowne: (a) 50 cents. (b) 25 cents. (c) 4 cents. (d) 35 cents.

No. 3 Scale—Between New York and Lenni: (a) \$1.75. (b) \$1.40. (c) 18 cents.

draw a charge of 20 cents per 100 pounds, with a minimum charge of 35 cents.

In Philadelphia no charge is made for collection or delivery on shipments over 1000 pounds within a radius of 20 blocks of Front and Market streets—two heavily traveled thoroughfares, the latter being the main divisional street of the city, east and west, for one pickup or one delivery.

All shipments of 1000 pounds or less draw a charge of 15 cents per 100 pounds in addition to the foregoing rates within the 20 block zone mentioned. Shipments over 1000 pounds beyond the 20 block zone draw a charge of 10 cents per 100 pounds in addition to the foregoing rates, and shipments under 1000 pounds beyond the 20 block zone a charge of 15 cents per 100 pounds. Local package shipments within the zone carry a charge of 20 cents per 100 pounds, with a minimum charge of 35 cents. Local package shipments beyond the zone are charged for at the rate of 35 cents per 100 pounds, with a minimum charge of 50 cents.

In New York City no charge is made for collection or delivery on shipments over 2000 pounds south of Forty-Second street, Manhattan, for one pickup or one delivery. For less than 2000 pounds the charge is 40 cents per 100 pounds in addition to the foregoing rates. For all other deliveries in New York or Brooklyn the charge is 50 cents per 100 pounds. The charge for local package deliveries or collections anywhere in New York or Brooklyn is 50 cents per 100 pounds.

Delays of Trucks Charged For.

Delays of 30 minutes or over, not including loading or unloading, at plants or warehouses or railroad terminal, are charged for at the rate of \$3 an hour or fraction of an hour. Where large contracts and guaranteed return loads are accepted there are special rates and serv-

CITIZENS TRANSPORTATION CO., Inc.

PHILADELPHIA—31 N. 6th Street

CHESTER—530 Market Street

NEW YORK—381 Broadway

THIS SHIPPING ORDER must be legibly filled in, in ink, in indelible pencil, or in carbon, and retained by the agent

Shipper's No.

Carrier's No.

CITIZENS TRANSPORTATION CO., Inc.

PHILADELPHIA—31 N. 6th Street

CHESTER—530 Market Street

NEW YORK—381 Broadway

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE

Shipper's No.

Carrier's No.

RECEIVED subject to the classifications and tariffs in effect on the date of issue of this shipping order the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as indicated below, which said Company agrees to carry to its usual place of delivery as designated herein, subject to the conditions on the back hereof

From

Date, 191

Address of Consignor at

Terminal of this Company, or Store Door of Consignor (Sold out use not used)

Consigned to

Address

City of

State of

For Delivery at { Terminal of Carrier at }
{ Address of Consignee }

No. Package	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	Declared Value	Weight or Bulk Subject to Commodity	FREIGHT CHARGES	Wt. Tax	ADVANCES	PREPAID

The value above declared by shipper is for the fixing of the rate of charge for the carriage of the shipment hereunder. (NOTE: Maximum liability 50 cents per pound unless insurance at tariff rate in effect is paid on declared value in excess thereof in addition to minimum rate in effect. See Section 3, hereof.)

Shipper

CITIZENS TRANSPORTATION CO., Inc.

Per

Per

The Standard Bill of Lading Form of the Motor Truck Owners' Association of Philadelphia, which this Company was the first to use; the Shipping Order is identical with the Bill of Lading Aside from the Identification Shown.

ice. No shipment is too small or too large to transport.

With regard to the extra charge for extraordinary delays at warehouses and railroad terminals, the company is so careful not to have complaint arise from any possible overcharge, that trucks, where such delays are probable, are equipped with special accurate recording instruments to record the time. Comparison of the rates charged by the company with those charged by express, railroad and steamship lines, considering the expeditious service rendered and the elimination of additional handling, is in favor of the company's tariff.

Shipments Well Insured.

The Shipper is well protected through insurance. The company carries insurance of \$5000 on each truck operated and additional insurance to the extent of the declared value handled by each truck. Fidelity bonds are required of all employees whose custody of merchandise requires such protection.

The Citizens' Transportation Co., Inc., is the first concern to put into actual use the new uniform bill of lading adopted late in November by the Motor Truck Owners' Association of Philadelphia, and already is employing both the bill of lading and its accompanying shipping order. This bill of lading was adopted to work uniformity among the city's motor truck operators and to furnish an equitable contract between operator and shipper. The contract provides for full coverage of the contents of trucks and full protection to the shipper. The face of the bill gives notice to the shipper that the basic rate of carriage is constructed upon a maximum liability of 50 cents per pound.

Any coverage in excess thereof on the basis of the declared valuation will be carried upon the payment of a rate of charge assessed on the basis of the basic rate plus the actual premium charges for full coverage above the maximum assumed by the carrier.

Collections are made at such points as there are deliveries. There is no troublesome routing and rerouting from platform to platform. Outside of full truck loads all merchandise is picked up and delivered by the smaller units and handled over the main receiving station platform. This system applies to each city where service is in operation and has a terminal. The pickup service is as carefully maintained as the long distance movements.

Conditions of Bill of Lading.

Section 1. The carrier or party in possession of any of the property herein described shall be liable for any loss thereof, or damage thereto, to the extent of the value declared in this bill of lading, except as hereinafter provided.

No carrier or party in possession of any of the property herein described shall be liable for any loss thereof or damage thereto or delay caused by the act of God, public enemy, quarantine, or the authority of law, or the act or default of the shipper or the owner, or for difference in weights of grain, seed or other commodities caused by natural shrinkage or discrepancies in public weights; and except in cases of the negligence of this company or its agents, it shall not be liable for loss, damage or delay occurring while the property is stopped and held in transit at the request of the shipper, owner, or party entitled to make such request or resulting from default or vice in the property, or riots, or strikes, or the loss of money, bullion, bonds, coupons, jewels, precious stones, valuable papers, or other articles of extraordinary value, unless the articles are enumerated in this bill of lading.

Section 2. In issuing this bill of lading this company agrees to transport only over its own line, and, except as otherwise provided by law, acts only

as agent of the shipper with respect to the portion of the route beyond its own line.

No carrier shall be liable for loss, damage or injury not occurring on its own route, or its portion of the through route, nor after said property has been delivered to the next carrier, except as such liability is or may be imposed by law, but nothing contained in this bill of lading shall be deemed to exempt the initial carrier from any such liability so imposed.

Section 3. No carrier is bound to transport said property by any particular truck, or in time for any particular market, or otherwise than with reasonable despatch, unless by specific agreement endorsed hereon. Every carrier shall have the right in case of physical necessity to forward property by any route or means between the point of shipment and the point of destination, but if such diversion shall be made the liability shall remain as if the entire carriage were made by the receiving carrier.

In consideration of the value herein declared being used as a basis for determining the rate to be charged, the amount of any loss or damage for which any carrier is liable shall be computed on the basis of such declared value of the property as herein stated under this bill of lading, including freight charges if paid. Except in case the actual cash market value of the goods carried shall be less than the declared value, then settlement shall be made on the basis of actual cash market value on the date of shipment, but the shipper shall in no case be entitled, after a false declaration of value, to any refund of charges made.

Claims for loss, damage or delay must be made in writing to the originating or delivering carrier within thirty days after delivery of the property, or in case of failure to make delivery, then within thirty days after a reasonable time for the delivery has elapsed; and suits for loss, damage or delay shall be instituted only within two years and one day after delivery of the property, or in case of failure to make delivery, then within two years and one day after a reasonable time for delivery has elapsed.

Section 4. All property shall be subject to necessary co-operation and bailing at owner's expense.

Section 5. Property not removed by the party entitled to receive it within forty-eight hours (exclusive of legal holidays) after notice of its arrival has been duly sent or given, as regards goods consigned to the terminal of this company, may be held at such terminal subject to a reasonable charge for storage, and the liability of the carrier shall be that of warehousemen only; or if such goods are bailed in consigned for delivery to a specified address other than the terminal of this company, the liability as common carrier shall terminate upon tender of delivery at the sidewalk or receiving platform of the consignee, and if the goods are not accepted on such tender, they shall be returned at the expense of the owner to the terminal of this company and held there subject to a reasonable charge for storage; or at the option of this company removed to and stored in a public or licensed warehouse at the cost of the owner, and there held at the owner's risk and without liability to the carrier and subject to a lien for all freight and other lawful charges, including a reasonable charge for storage.

The carrier may make a reasonable charge for the detention for loading and unloading of any truck for a time in excess of thirty minutes exclusive of actual time consumed in such loading or unloading, and may add such charge to all other charges hereunder and shall hold such property subject to a lien therefor.

Section 6. Every party, whether principal or agent, shipping explosives or any other dangerous goods without previous full written disclosure to the carrier of their nature and having the same expressly endorsed hereon, shall be liable for all loss, damage caused hereby and such goods may be warehoused at owner's risk and expense, or destroyed without compensation.

Section 7. The owner, or consignee, shall pay the freight and all other lawful charges accruing on said property, and if required shall pay the same before delivery. If, upon inspection, it is ascertained that the articles shipped are not those described in this bill of lading, the transportation charges must be paid upon the articles actually shipped.

If any C. O. D. is not paid within thirty days after notice of non-delivery has been mailed to the shipper, the carrier may, at option, return the property to the consignor.

Section 8. Any alteration, addition, or erasure in this bill of lading which shall be made without an endorsement thereof hereon, signed by the agent of the carrier issuing this bill of lading, shall be without effect, and this bill of lading shall be enforceable according to its original tenor.

The System of Accounting.

In the system of accounting there is a delivery receipt for the consignee and delivery is made on a way bill left with the consignee, it being in duplicate of the delivery receipt signed by the consignee. A copy goes forward with the truck to the receiving station and another copy goes to the office of the transportation company for billing purposes. A manifest is made out for each unit on a trip, one copy remaining at the warehouse platform office. This is used as a route sheet and bears on its face the routings for de-

livery and instructions as to what stops the truck is to make. It also contains a statement of weights and declarations of value of the merchandise, the names of consignor and consignee, with the destination of the shipment. One copy of the triplicate form remains at the platform, one goes with the truck and the third is sent to the office for record.

This form is used for pickup trucks, as a driver's check list and the goods unloaded are checked at the platform against the manifest. By means of these records an accurate daily statement of the tonnage handled by each unit is obtained, as well as the record of values collected by each unit. The "C. O. D.'s" are handled through a special slip and are covered in addition in the manifest.

There is also a driver's card on which are noted the time of departure and of reporting at the various stations, to be signed by the agents of the company; the expense of the trip, including gasoline in the truck at the time of leaving and the amount of gas, if any, purchased on the road. There are also checks showing the record of the driver in the return of all receipts, or money handled by him and a detachable slip upon which the driver is to report any repairs necessary to the truck, which slip is turned into the garage, and whereon the mechanics record the results of their examination. This sheet, applicable to all units, supplies a complete daily record of the cost of road operation for each truck. Another form is used for daily reporting by those in charge of the various stations of the expenses and receipts.

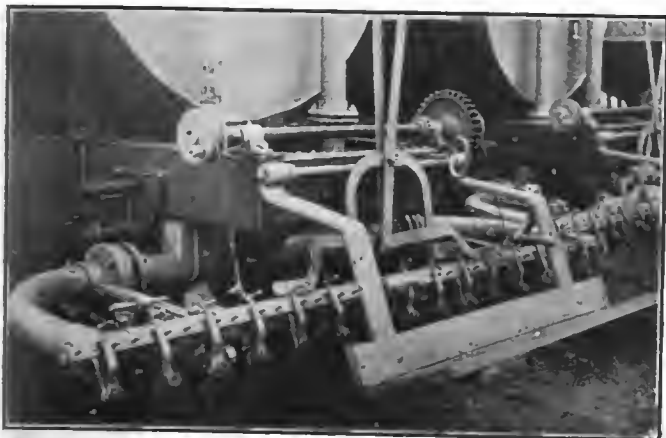
The company plans a varied expansion program, one of the first steps in which will be the establishment in the very near future of a receiving station in Wilmington, Del., where it has been ascertained that a desirable volume of freight for shipment can be obtained. Wilmington, an important powder plant and shipbuilding center, is always included in the "Philadelphia district" when mentioned by Philadelphia transportation companies.

The Citizens Transportation Co., Inc., rather courts, than avoids, any possible criticism, using the constructive suggestions it may receive from outside to apply to the betterment of its service.

LIPPARD-STEWART COMPANY REORGANIZED.

The Lippard Stewart Motor Car Co., established at Buffalo, N. Y., and manufacturer of trucks, which encountered financial difficulties, has been reorganized, new capital has been interested and the factory and equipment and stock of materials have been removed to Syracuse, N. Y., where the company will establish itself in a new plant. The intention of the officials is to engage in the manufacture of trucks on a larger scale than ever before. The manufacturing plans, types, sizes and prices of vehicles and sales policies will shortly be announced.

An agency contract has been made with the Bigelow-Willey Co., Philadelphia, Pa., by the Bessemer Motor Truck Co., Grove City, Pa.



View of the Distributing System of the Combined Road Oiler and Water Pump, Showing the Distributor Head, the Control Members and the Running Board for the Operator.

Combined Municipal Road Oiler and Water Pump.

Apparatus designed for distributing oil on highways, that has several qualities original with this construction, is used by the California Highway Commission in the southern part of that state, and by the city of Los Angeles. A very large part of the roads and streets of the south part of the state are treated with oil to suppress dust, and for this reason special apparatus has been found especially valuable, for it is used practically nine months of the year. Four apparatuses are in use, one in the service of the highway commission, and three are operated by Los Angeles department of public works.

The apparatus was built by the Baker Iron Works, and that of the state is mounted on a Moore chassis, but those of the city on Moreland chassis. The main feature of the distributor is a three-way pumping station, with which a fluid may be pumped into the tank from an exterior course, from the tank to an outside container, or from one outside tank to another without passing through the tank of the apparatus. The equipment can be used for general pumpage, as well as oil distribution. The tank can be filled by gravity through a manhole on top.

The tank is interchangeable with a dump body and the chassis is fitted with a body hoist that is permanently installed and may be seen just back of the seat in an accompanying illustration. The capacity of the tank is 1000 gallons. The tank is covered with a one-inch jacket of insulating material, secured with a half inch of plastic cement, and all is covered with canvas and a No. 16 steel jacket so that the temperature of the content may be kept sufficiently high for application for a considerable number of hours.

The pump is driven from the chassis engine by a roller chain, a sprocket and a Dodge friction clutch. The pump is a rotary geared type, specially designed for mounting on the front head of the tank, and all moving parts are readily accessible. The discharge pipe of the pump passes through the rear head of the tank and is fitted with a three-inch Crane an-

gle valve on one side of the distributor and a three-inch crane angle relief valve on right side. The distributor has swivel bosses at each end, and these are mounted on two specially designed swivel joints.

Each hose of the distributor is equipped with a special two-outlet brass plug cock, each cock outlet having two machined steel tips. The plug cocks are connected by steel levers and mechan-

ism for opening and closing them. The two spray tips in each cock are different sizes, affording light or heavy flows of oil. The distribution of oil on the road can be graduated by variations of the control levers, and there is no reason at any time to change the spray tips to vary the flow of oil. There is a relief valve in the distributor system so that all excess oil is returned to the tank and the content of the tank is kept in circulation and there is always a constant pressure on the distributor head.

One of the accompanying illustrations shows the entire equipment mounted on a Moore chassis, and the other shows the detail of the distributor, the two-spray tips of each cock, the control levers and the rear running board on which the operator stands. The board is hinged so that it may be folded out of the way when not in use. A speaking tube extends from the rear of the tank to the seat of the driver, so that orders may be given by the operator without any possibility of error.

POWER VEHICLE PRODUCTION DURING WAR TIME.

According to figures stated to be gathered by government officials in connection with the control of the production of the automotive industry during the period of the war, which are now available, during the first nine months of 1918 824,606

passenger cars and 126,346 trucks were produced, not including the vehicles ordered by the government for war purposes in the total of trucks. This was a total of 960,952.

The estimated production of cars and trucks for the remaining three months of the year is 150,000 cars and 46,300 trucks, a total of 195,300. Assuming that the estimate is correct this would give a total production for the year of 974,606 cars and 182,646 trucks, or a total for both types of vehicles of 1,157,252. During 1917 the total production of passenger cars was 1,718,000, and of trucks 160,000, so that there will be a decrease in production if these figures are realized, of 744,394 passenger cars and an increase of 22,646 trucks, a net reduction of 721,748.

No statement is made of the total production of cars, trucks and tractors for the different governmental departments, which probably will aggregate 100,000 for the year.

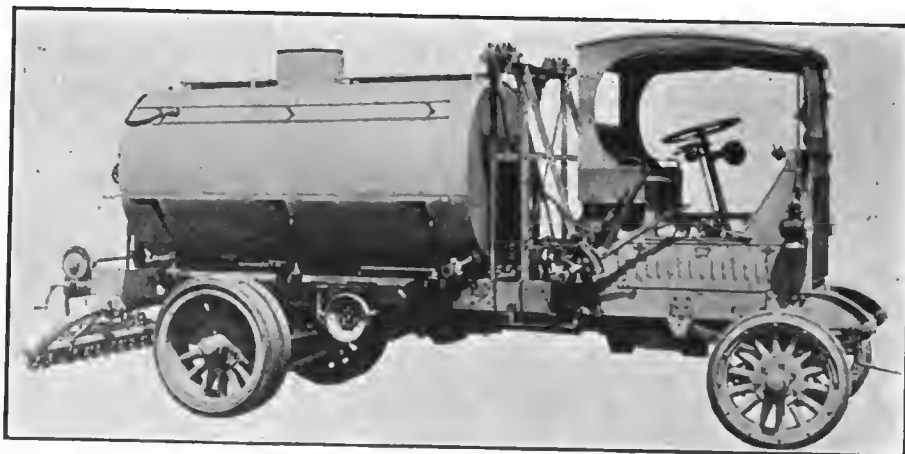
REPUBLIC MAY ESTABLISH A CANADIAN PLANT.

There is considerable probability, if statements originating in Canada are to be given credence, that the Republic Motor Truck Co., Alma, Mich., will establish a plant probably at Toronto, for assembling Republic trucks that will have approximately a capacity of 5000 machines a year. The purpose is to supply the Canadian demand for trucks from this plant, this saving the payment of duty and making possible a lower price than would otherwise be practical with machines constructed in the United States.

R. S. McLaughlin, president of the McLaughlin Motor Car Co. of Oshawa, Ont., has been elected a director of the General Motors Corporation and made a member of the executive committee of the board.

L. C. Sprague has been appointed assistant secretary of the Chicago Pneumatic Tool Co., and is established at 62 Vanderbilt avenue, New York City.

The 16th annual convention of the American Road Builders' Association will take place at New York City, Feb. 25-28.



Oil Distributing Outfit on Moore Chassis Designed by Baker Iron Works for California Highway Commission—This Is Interchangeable with a Dump Body, Adapting the Equipment for General Municipal Service.

GMC-SAMSON TRACTOR PLANT AT SAGINAW.

As soon as the contract now being filled by the General Motors Corporation, at the Marquette Motor Co.'s plant at Saginaw, Mich., is filled, the works will be converted for the manufacture of farm tractors. There is belief that the machines to be produced will be the GMC-Samson, now being built at Pontiac, Mich., and Stockton, Cal. The production of tractors was the result of a conference of W. C. Durant, president of the corporation, and George H. Hannum, manager of the Saginaw properties. With the conversion of the plant from shell production, and the addition of machinery, the manufacture of tractors will be begun. Statement is made that the corporation has on hand many large orders for tractors, and unless the Marquette works was operated there was little probability that these could be filled. The tractor production will continue under the management of Mr. Hannum.

PIERCE-ARROW STILL HAS WAR CONTRACTS.

The completion of contracts for trucks made with the French and United States governments will, according to statement, keep the plant of the Pierce-Arrow Motor Car Co., Buffalo, busy until well after the beginning of the new year, and meantime the company is preparing to resume the production of both cars and trucks on a large scale, so that there will be comparatively little interruption in the output of the company.

I. H. Miller, for 23 years with the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., a part of that time as superintendent of the industrial and small motors department, has been appointed superintendent for the Sperry Gyroscope Co., Brooklyn, N. Y.

During September the oil shipments from Mexico were in total 5,489,000 barrels, which was 250,000 barrels more than had been shipped in any previous month.

Texas Dairy Company Builds Business with Trucks.

The agricultural development possible through the use of power vehicles are evident enough to those who are even casual observers, and those who are the first beneficiaries are operating farms within short distances of commercial centers, which can consume farm products in considerable quantities. Obviously, where shipments must be made long distances the expense of transportation must be added to the market values, which necessitates prices more or less restrictive.

Texas is a great agricultural state, but its mechanical industries are comparatively small, so that the prosperity of the commonwealth is largely dependent upon the crops produced and the markets that can be obtained for them. Of all the Texan cities there is none that has had more phenomenal growth and development than San Antonio. For one thing it is the center of a group of United States army posts, which were added to constantly during the war with Germany, and it is a railroad center of large importance. The city has many business enterprises of considerable magnitude and one of these has been developed through having quick and constant means of reaching the farmers within a reasonable radius.

This is the Kline Creamery Dairy Co. of which J. F. Kline is the head, which has grown with extreme rapidity and now has branches at Yackum, El Campo, San Benito and Corpus Christie. The growth has been brought about by encouraging the farmers to increase their dairy products, insuring them a ready market and undertaking the collection and transportation from the farms to the stations. With prospect for increased profits the farmers have greatly developed production. This fact is established by the expansion of the San Antonio plant four different times, and now an addition is being made at a cost of \$65,000, as well as remodeling the other buildings and improvement of facilities.

Besides the distribution of milk, cream, butter, cheese and other products, the company delivers about 2000 gallons of cream daily, which is done with a fleet of trucks. After six years' continued use of two Federal trucks the company decided to standardize its equipment with Federal machines, and disposed of its horses, replacing them with seven trucks, and has ordered two more, so that the fleet will eventually be nine. Five different army posts are supplied from the San Antonio plant. Fort Sam Houston is two miles distant, Camp Trevis three miles, Kelly Field eight miles, Brooks Field nine miles, and Camp Stanley 22 miles. Besides these the hostess houses and base hospitals receive daily deliveries, as well as small stores outside the camps. The trucks collect the products and distribute them and really create a market which would otherwise needs be developed by the individual farmer.

CHAPIN RESIGNS FROM HIGHWAYS COMMITTEE.

Roy D. Chapin, who was appointed chairman of the Highways Transport Committee of the Council of National Defense when that body was created, has tendered his resignation to Secretary of War Baker, chairman of the council, with the request to be relieved as quickly as this can be done. Mr. Chapin is president of the Hudson Motor Car Co. and he desires to return to his business at Detroit. He has been located in Washington more than a year and during this time his endeavor was to energize the highways of the nation and increase their use for haulage to the fullest degree.

Mr. Chapin has been much interested in the organization of rural express routes and the development of the commercials as the markets for food crops by affording constant and dependable haulage service. With Mr. Chapin's retirement the work of the Highways Transport Committee will be assumed by John S. Cravens, chief of the field division, Council of National Defense, and there is expected to be no cessation of its activities.

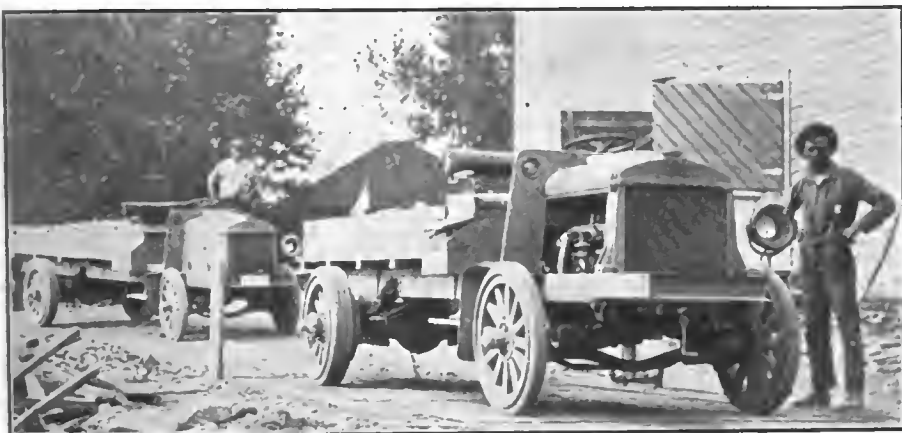


Sales of Dairy Products by Texas Farmers Greatly Increased by Use of Motor Trucks by Creamery Co.: At Left, One of the Kline Fleet of Federals at a Branch Station; at Right, Part of the Equipment of the Loading Platform of the Main Plant.

TRUCKS SAVED STEEL INDUSTRY

More Than 7000 Tons of Chrome Ore, Needed for War Work, Hauled 68 Miles on Mountain Trail, from Mines in Siskiyou County, Cal., to Railroad.

By James G. Stafford.



The First of the Fleet of Fageol Trucks Used for Hauling Chrome Ore to Meet the Government's Requirements for War Work, Reaching the Railroad Station at Hornbrook, Cal.

HAULING 7000 tons of chrome ore a distance of 65 miles from the Selad Valley mines in Siskiyou county, California, to the railroad at Hornbrook, near the California-Oregon boundary line before winter snow blocked the roads was the work demanded by the government of contractors operating a fleet of 24 $2\frac{1}{2}$ -ton Fageol trucks. Chrome ore is an essential of immediate need in the production of high grade steel for arms, ammunition, aviation engines and other high quality machinery.

The fleet of Fageol trucks, under the direction of contractors Benjamin H. Maddox & Co. of San Francisco, and H. W. Rohl of Sacramento, has been operated in this work from the mines in Siskiyou county to Hornbrook on the main line of the Southern Pacific railroad. The contract was undertaken about the middle of August and a large part of the work was done when hostilities ceased and the urgent demand was much decreased.

Before the beginning of the European war chrome ore was brought into the United States from foreign countries as ballast for vessels at a comparatively small freight rate. It reached the eastern smelting centers at a low cost because of short rail hauls. Because of the tremendous demand for "bottoms," this manner of shipping was discontinued, but the need for chrome led to the development of chrome ore mining in deposits in different parts of the country.

The United States used 150,000 tons of chrome ore last year. Domestic mining operations had acquired sufficient headway to produce only 48,000 tons of this total. There are, however, chrome ore deposits in the United States from which the entire demand for this mineral may

be supplied. Probably two-thirds of the chrome ore needed this year will be mined in the United States.

California Has Chief Supply.

As in many instances, California is the source from which the greater part of this very necessary metal is obtained. Three-fourths of the entire production of chrome ore needed for the government purposes will come from California and Southern Oregon, and of this Pacific coast production about 90 per cent. will come from Siskiyou county, California, in which the Selad Valley properties are located. All of the ore taken out has been transported over a 65-mile road of the

very roughest sort by this fleet of 24 Fageol $2\frac{1}{2}$ -ton trucks.

There are three important mines in the Selad Valley district. Two of them are operated by J. F. Reddy of Medford, Ore., which are generally known as the "Black Beauty Mines" in the Selad Valley, and the "Lucky Boy" mines out of Hamburg. The other mine of important capacity in the Selad district is operated by Samuel H. Dolbear.

Chrome ore is ordinarily found in small pockets. A deposit that would produce more than 2000 or 3000 tons of high grade ore is quite unusual, although there are in this Siskiyou county mineral belt deposits that already have produced more than this tonnage and are apparently still far from being exhausted.

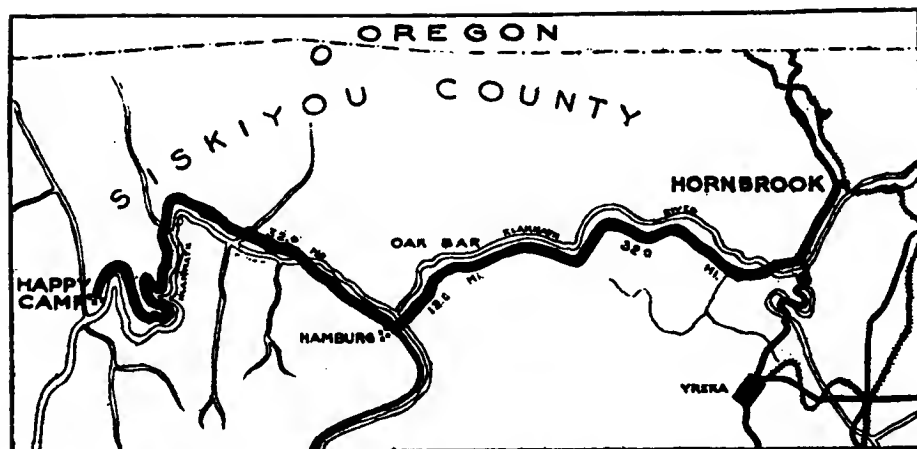
Chrome ore deposits are invariably located high up in the mountains. The ore is mined by hand. Mining operations are comparatively simple—more in the nature of quarrying than the customary gold mining operations. The ore is piled on the dumps at the mine and is either trammed or sledded down the steepest places to bunkers or loading platforms, from which the trucks receive it. The higher the grade of ore the greater its weight.

Transportation a Vital Need.

The most vital need in the production of chrome ore at present is transportation, because practically every important chrome ore deposit in the United States is far removed from railroad lines. As indicated the mining operations are relatively simple, and also that the Selad district properties have deposits of great magnitude, but the ore is of comparatively no value unless it can be transported to a railroad and shipped East to the smelters. Furthermore, chrome ore is essentially important in the war program, since it plays such an important part in the production of ammunition and guns. When peace is declared chrome ore de-



Unloading the Chrome Ore, Almost Priceless Because of the Need of Special Steel for War Munitions, at the Hornbrook Station.



Map Showing the Mountain Road Through the Klamath River Canyon, on Which the Chrome Ore Was Hauled from the Mines, 65 Miles from the Railroad.

posits located 65 miles from a railroad will probably remain undisturbed for many, many years; thus the need of the government was dependent entirely on transportation—and relatively quick transportation—from the mines to Hornbrook, the main line of the Southern Pacific railroad.

Several attempts had been made by other contractors operating motor trucks to transport the chrome from the mines. It meant hauling a minimum tonnage of ore per day at a cost that would not be prohibitive to miners, and would show fair profit to the contractors. Apparently the reason for failure on the part of other contractors was the lack of an organization for operating the trucks between the mines and railroads. Benjamin H. Maddox, who owned 15 heavy duty motor trucks before he took this chrome ore hauling contract, is one of the best known trucking contractors in California. His success is largely due to the careful plan for handling the work, and operating to this system under his personal supervision with capable truck drivers, dispatchers and mechanics.

Mountain Haulage Increased Work.

The transportation of 7000 tons of chrome ore in a period of approximately 100 working days 65 miles over a mountain road means that these trucks will have to their credit 455,000 ton-miles before they will complete the contract. It meant also that it was necessary to haul 75 tons a day to get the full tonnage out before snow blocked the road.

So far as known there was no other trucking operation in the United States of this character or of this magnitude when this contract was undertaken. It is believed that the 24 Fageol trucks worked on this contract is the largest fleet of the same make and of 2½-ton capacity units hauling ore at any place in this country, which probably means in the world. Aside from the transportation contracted for by the government it is believed to be one of the largest trucking operation ever undertaken in the United States.

The conditions for operating trucks were very poor for the road follows the canyon of the Klamath river. It is an old post road from Hornbrook to the coast, and was originally an Indian trail. According to statements it is not much

more than a trail now. It is narrow, practically its entire distance, except the upper eight miles leading into Hornbrook station, which is a section of the Pacific highway to Portland. As an indication of the condition of the road it takes five to seven hours for a passenger car to cover the distance of 65 miles.

Road Through River Canyon.

The river road has been used by wagons and automobiles for many years and there are well defined ruts quite close together as a result. The rear wheels of the trucks, being broader than the ruts, are forced to ride on the sides of the tires. Very serious tire wear and greatly increased expenses of operation are a consequence. The ordinary solid tire can be driven about 15 round trips, or 1000 miles, before it is so worn it must be replaced. With trucks formerly used by other contractors on this haul no such tire mileage was obtained by them.

The value of the easy riding qualities of the Fageol 2½ tonners with capacity loads of ore is well established by this very satisfactory tire mileage. This is claimed to be the result of the patented spring oiling system, which feeds lubricant automatically from reservoirs in the spring hangers by wick and capillary attraction, and insures the springs having the highest degree of flexibility. This, of course, means that the load rides more easily, and the road shocks are absorbed

by the springs rather than being transmitted through the wheels to the frame and motor mechanism. The trucks are maintained to handle more easily on the narrow roads and are operated at considerably less expense than other makes.

The contractors get approximately \$75 freighting per round trip of 130 miles. The trucks are operated day and night and one truck makes three round trips in two days. This, of course, is accomplished by the continual driving with relays of drivers.

Operating Plan Carefully Made.

The operating plan with which Contractors Maddox and Rohl have made a success of the work was carefully developed. A camp was established at Oak Bar, a little settlement about midway between the mining district and Hornbrook. Trucks are operated in trains of five to 10, and the dispatching is so timed that one section leaves Oak Bar camp for the mine as the other leaves for Hornbrook. No truck driver is permitted to operate a truck for more than eight hours. This is because of the extreme danger of the narrow river canyon road. There is but a narrow shoulder between the wheel tracks in the roadway and the almost perpendicular bank of the river. An instant's inattention would possibly result in a plunge into the water below. A drowsy or careless driver could cause much loss of property and perhaps life, so one of the rigid requirements by Maddox and Rohl relates to truck control and attention. The drivers must give their attention to driving at all times and for the entire distance. If such attention is given there is no reason for a truck leaving the road.

System in trucking operations must deal with handling the drivers and mechanical care of the trucks. Both Mr. Maddox and Mr. Rohl have made careful provision to insure complete supervision. At Oak Bar Camp there are in addition to the 50 truck drivers employed the camp boss, who is in charge of all mechanical work and truck inspection and a train boss for each group of trucks on the road.

Careful Truck Inspection.

Before being sent out with a load each truck is given a careful inspection. The



One of the Incidents of Ore Haulage—Freighted Truck Off the Runway at the Hornbrook Station Loading Dump—A Minor Mishap When Contrasted with the Constant Danger of the Main Road.

drivers are allowed one hour a day for doing whatever general work may be necessary on each truck. As nearly as possible the drivers work in relay teams, each operating one particular truck. A bonus system, in addition to the regular wage is paid, and it is possible for the drivers to make as much as \$1 a day extra by bringing their trucks into camp on schedule time and in good condition.

When actual mechanical repairs are necessary or the tires must be replaced, etc., such work is taken care of by the mechanics, who form an important part of the contractors' organizations. Each truck is inspected by the camp foreman before time for leaving and if it is not in good condition it is not sent out. The driver is then required to put it into good operating condition on his own time. Most of the drivers are efficient, capable men and take pride in maintaining their trucks to a high mechanical standard.

The round trip requires 16 hours and it is usual practise to make three round trips in two days. The haul is up grade from the Selad Valley mines to Hornbrook and requires eight hours from the Oak Bar Camp to the mine and return with a load, and eight hours from the camp to Hornbrook, returning to camp empty. When it is possible the trucks are given a return haul of supplies, important mine machinery and other equipment. Drivers are glad to get such a load as it makes the trucks ride much easier over the rough road.

Trucks Carry Excess Loads.

The ore hauling bodies on the trucks are four feet wide, 12 feet long and 14 inches deep. The full load of chrome weighs from 2½ to four tons and because of the character of the road the trucks must necessarily be driven at a low rate of speed. It has been deemed advisable by Contractors Maddox and Rohl to operate their Fageol trucks on this haul with a load of more than the factory rated capacity, and they carry three tons of chrome ore in addition to the bodies on the 2½-ton chassis.

While none of the grades on the road are prohibitive, although there are many sharp pitches for distance of 200 or 300 yards. These are stiff grades and are very rough, rutted and try the truck's power to the utmost. Passing is extremely difficult because of the narrow road. Loaded trucks have the right of way and frequently a truck driver must hack for the distance of a half mile or more to let a load of chrome pass him.

At present the government has 40 men working on this road to make it suitable for winter hauling, and it is understood that an appropriation of \$15,000 has been made to improve the road. This improvement is an undertaking of unusual proportions, as the road is cut into the banks of the Kiamath river, which in a great many instances are practically perpendicular both above and below the road.

Agency contracts have been made by the United States Motor Truck Co., Cincinnati, O., with F. A. Jack, Louisville, Ky.; Stearns Motor Car Co., Youngstown, O.; Creele Motor Car Co., Birmingham, Ala., and Wehh & Bush, Lexington, Ky.

BETHLEHEM STEEL COMPANY MAY BUILD TRACTORS.

Statement has been made and given wide credence that the Bethlehem Steel Corporation is to engage in the manufacture of farm tractors, but this has not been confirmed by the management. The plants that have been devoted to the production of war munitions are very large, advantageously located with reference to obtaining supplies of raw materials and shipping products, and they are equipped with the best machine and tool facilities obtainable.

The corporation has authorized the publication of a statement to the effect that undoubtedly the plants that will discontinue the production of munitions will be given over to the manufacture of products that will be required by the commercial and industrial enterprises of this and foreign nations. The tractor industry appears to have very large possibilities, especially if operations are on a large scale, and the Bethlehem corporation has the resources and the facilities to not only produce, but to exploit foreign markets to whatever degree may be desirable. For this reason there is some reason to believe that the prospective production of tractors, and possibly farm implements, has a foundation of fact.

COLT CHAIRMAN OF BOARD OF U. S. RUBBER.

Col. Samuel P. Colt, for 18 years president of the United States Rubber Co., the largest manufacturer of rubber products in the world, with subsidiary companies in different sections of the country, has declined to serve longer in that capacity and at the last annual meeting of the directors, following the meeting of the stockholders, was elected chairman of the board of directors. Lester Leland, for a long period vice president of the company, was elected vice chairman of the board. Charles B. Seger, for two years a member of the board of directors and the executive committee, was elected president. He is connected with Kuhn, Loeb & Co., one of the largest banking concerns of the country, and previously to that connection was associated with several railroad companies.

ARMY TRACTOR ADDITION TO FORD PLANT AN ASSET.

Though the War Department cancelled a very large contract made with Henry Ford & Son, Dearborn, Mich., for the production of tractors for the use of the United States army, there is a nearly completed addition to the works that will no doubt be turned to good account. The contract was of such proportions that a structure having 180,000 square feet of floor area was contracted for and the work on this had well advanced when the contract was cancelled. The addition was to cost \$1,000,000. The building was designed especially for tractor production and will probably be utilized in future expansion of the plant.

MEXICO WANTS AUTOMOTIVE VEHICLES BADLY.

Mexico is a land practically without good highways and it is cursed with cheap labor, so that there is lacking in that country as a market two of the principal incentives for the use of automobile vehicles and power farm equipment. But the economies of cars, trucks, tractors and, of course, farm implements that can be used with tractors, have so impressed the Mexican government that it has suspended all import duties on these for a period of a year.

This fact is important to tractor and truck manufacturers, as well as to implement producers, for with Mexico open to exploitation a great deal of interest could be created and no doubt a substantial foundation could be laid for future profitable transactions. The fact that the roads are poor is not an obstacle to the sale of automobile vehicles. Those of the United States as a whole are not comparable with Western Europe, but there are less than 500,000 machines in use in Europe as against at least 5,500,000 in this country. Good roads can only come when the people realize the necessity and economy of constructing them.

ZIMMERMAN RETIRES FROM CONTINENTAL.

At a meeting of the board of directors of the Continental Motors Corporation, Detroit, A. H. Zimmerman, treasurer of the corporation and a member of the board, presented his resignation in both capacities, which was accepted. He was succeeded by George W. Yeoman, who was elected treasurer, who will continue to serve as director of sales and advertising. W. R. Angell, secretary, was at the same time elected assistant treasurer and a director of the corporation.

VICTORY COMPANY ACQUIRES GIBSON-HOLLISTER.

The Victory Manufacturing Co., Thompsonville, Conn., has acquired by purchase the assets and patents of the Gibson-Hollister Co., Springfield and Boston, Mass., and the plant of the Upson-Martin Co., Thompsonville, at which it will manufacture spark plugs for tractors and trucks, the Croxford rim tool and electrical specialties. The company will have production well under way by the first of the year.

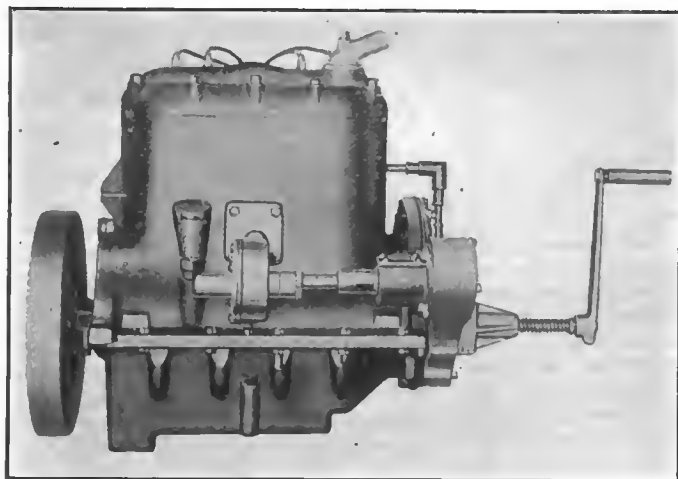
FLINT WILL GIVE SITE FOR GENERAL MOTORS PLANT.

The Board of Commerce of Flint, Mich., has offered to purchase and present to the General Motors Corporation a large area of property on the east side of the city suitable for the site of a manufactory, provided that the corporation will locate in that city a proposed plant that will afford employment to several thousands of men. As yet no reply has been made to the Board of Commerce by the corporation.

LIGHT MODEL H TRUCK ENGINE

WHAT is regarded as being the best machine it has produced is the model H engine, built by the Light Manufacturing and Foundry Co., Pottstown, Pa., which has been designed for small tractors and light trucks. The engine is primarily what may be classified as a medium speed type and the full power rating is produced well within its limitations. This company has built engines for years, specializing those of comparatively small power, and statement is made that the model H has every quality desired by those who require endurance, low fuel and lubricant consumption and economy of maintenance.

The design is extremely simplified, great care being taken to obtain fullest accessibility for inspection, adjustment or repair, and while every part has been fully protected and well lubricated, these may be reached with a minimum of labor. The main object has been to economize labor required for maintenance, and this result has been unusually well attained.



Right Side of the Light Model H Tractor and Truck Engine, an Extremely Simplified Design, Having a Rating of 16.90 Horsepower by the S. A. E. Formula.

All moving parts are made with large contacting surfaces to insure against wear so far as this is possible, and wherever practical all parts are interchangeable. Statement is made that the design was intended to afford maximum horsepower and mileage from consumption of given volume of fuel and lubricant, and that exceptional flexibility has been realized.

Engine an L Head Type.

The engine is a four-cylinder, four-cycle, vertical, water cooled, L head type, with cylinder bore of $3\frac{1}{4}$ inches and stroke of $4\frac{1}{2}$ inches, having a rating of 16.90 by the S. A. E. rating of horsepower. This is obtained at 1334 revolutions a minute, but in excess of 29 horsepower has been developed in practical tests at a maximum of 2500 revolutions, as shown by power curves. The compression ratio is 3.94 and the compression is 60 pounds, which is relatively high.

The cylinders and the upper section of the crank case are cast as a unit, from a high grade of semi-steel, with the water jacket integral. The cylinder head is a

separate casting, this containing the combustion chambers, the division of the block being at the top center of the pistons. The cylinder block is exceptionally well jacketed, the chamber on the right side extending to the top of the crank case, and on the left or valve side approximately two-thirds of the length. In addition the block carries the exhaust and intake manifolds integral, the intake manifold extending horizontally under the exhaust. The outlet of the exhaust manifold is at the forward end and the fuel intake is at the rear end of the manifold.

Uniform Cylinder Walls.

The design of the block is such that extremely uniform cylinder and water jacket walls are obtained, and much care is taken in clearing the water passages so that there will be freedom of circulation and adequate cooling. The circulation may be either thermo-syphon or forced by pumpage, according to the requirements of the tractor or truck builder, there being adequate volume of water

when the system is thermo-syphon for practically every purpose. The head casting is crowned directly over the centers of the combustion chambers to obtain high cooling efficiency and this also serves to direct the water from the rear to the large outlet at the forward end.

At the forward end of the crank case section of the block there is an extension that houses the timing gearset, and on the rear end of the block, above the crank case, is a bracket with heavy web reinforcements

into which is seated a stud which is carried through a bracket on the crown of the flywheel bevel housing, the stud anchoring the housing and affording fullest rigidity. By this construction the engine may be adapted to any requirement, either a unit power plant or with the transmission gearset independent. There is a lower flange to which the flywheel housing is also bolted. This design makes for unusual utility without excessive weight.

Lower Section a Cast Unit.

The lower section of the crank case is cast from the same material as the cylinder block, and it has a web that forms the bottom of the crank chamber and in which are the oil troughs. Under this web is the oil reservoir, that extends the full length of the section, and below this at the rear end is the sump or well from which the lubricant is drawn. This sump may be drained by removing a plug. The forward end of this section is extended to house the timing gearset.

There are wide flanges for the sections and the cover plate of the gearset hous-

ing, and the cover plate has very generous bosses for the retaining bolts. The housings for the timing gearset and the flywheel are designed for the installation of a two-unit starting and lighting system, the machined openings being fitted with covers if such system is not installed. When the flywheel is housed the housing has the side support arms integral with it, these being to standard dimensions.

The pistons are cast of a high grade of gray iron and are four inches length. They are grooved for three compression rings that are fitted above the wristpin, and the piston bosses are webbed to obtain strength and lightness. The pistons are four inches length and weigh $1\frac{1}{2}$ pounds each. The machine work on the cylinder block, lower section, head and pistons is very carefully done, much care being taken to obtain accuracy of dimensions and perfect fitting.

Crankshaft and Reciprocating Parts.

The crankshaft is drop forged from a special alloy steel, with the flywheel flange integral. It is a two-journal type, $1\frac{1}{2}$ inches diameter and the front and rear journals are $2\frac{3}{4}$ and $2\frac{1}{2}$ inches length, a total of $6\frac{1}{2}$ inches. The shaft is machined, heat treated and carefully ground to size. The camshaft is drop forged from high grade steel with the cams integral, and it is also a two-journal type. It is $1\frac{1}{4}$ inches diameter and the diameters of the front and rear bearings are $1\frac{5}{16}$ and $1\frac{1}{2}$ inches respectively. This is rough machined, heat treated and case hardened and ground to obtain exact cam contour.

The connecting rods are steel drop forged I sections, heat treated, and the caps are retained with two bolts each. The wristpins are hardened steel tube, case hardened and ground to size, that are clamped in the small ends of the connecting rods, the pin oscillating in the piston bosses. The main and connecting rod bearings are high grade babbitt metal, or combinations of bronze cages and babbitt, according to the specification of the buyers. Either type may be had. The bushings of the piston bosses are bronze.

The Timing Gears and Valves.

The timing gearset consists of three gears, the crankshaft gear being drop forged from mild steel, the camshaft gear of cast iron and the magneto shaft gear of semi-steel. These have faces $\frac{7}{8}$ inch width and are helical cut so that they are practically noiseless in operation. The valves are the conventional poppet type with ports $1\frac{1}{2}$ inches diameter, with cast iron heads electrically welded to carbon steel stems, that have a lift of $\frac{9}{32}$ inch. The valve guides are very long. The valve tappets are a mushroom type, fitted with adjusting screws and nuts, and these operate in renewable cast iron guides. The valve mechanism is covered with a long steel plate seated on webs, that is retained by a pair of studs and wing nuts.

The engine is cooled by a circulation of water through the cylinder jackets and a system including a radiator of whatever type is determined, the movement being

either by thermo-syphon or pumpage. The pump, when fitted, is a centrifugal type, and the system includes a three-bladed fan that is carried on an adjustable bracket fitted on the top of the timing gearset housing, that is driven by a flat belt from a pulley on an outside shaft that drives the magneto and water pump. The conventional ignition system is high-tensioned, with either battery or magneto as a source of current, and the magneto bracket is adapted to fitting any standard make or type. The magneto shaft coupling recommended is a flexible leather universal joint that will compensate alignment and insure that the shaft will be free from side pressure.

The Lubricating System.

The engine is lubricated by a combination pressure feed and splash system. The oil is drawn from the reservoir, which has a capacity of three quarters, through a screened intake, and into a copper duct outside of the crank case by a spring plunger horizontal type pump at the forward end of the crank case, that is actuated by an eccentric on the camshaft. The oil is delivered into a canal in the flange of the reservoir section, when it flows into the troughs in the base of the crank chamber and is distributed by splash to the cylinder and piston walls, the main, connecting rod, wristpin and camshaft bearings, the timing gearset, the cams and valve tappets. The oil troughs are the same height and maintain the oil level so that there is adequate lubrication. Because of the construction of the oil reservoir there is no probability of sediment or foreign matter being drawn into the system and clean oil is assured at all times. There is an oil gauge at the right side of the engine with a removable rod, the level of the lubricant being shown by the wetted surface of the rod as it is taken out.

The fuel is supplied by any standard make of carburetor that is satisfactory to the purchaser, the carburetor being bolted to the flange at the rear end of the intake manifold. The design of the combination manifold is such that there is a "hot spot" in the manifold between the carburetor and the combustion chamber. The manifold has two bends, the first as near the carburetor as is possible, which affords segregation directly after the fuel leaves the carburetor and it is driven into the air stream in the form of a fixed gas. The heat completely vaporizes the mixture and insures maximum horsepower and mileage. Statement is made that the engine can be driven 5000 miles or more without evidences of carbon, and that some drivers have not cleaned spark plugs or reground valves until more than 10,000 miles had been covered.

PLAN TO BUILD FOUR-WHEEL DRIVE TRACTOR.

The controlling interest of the Ypsilanti Press Co., Ypsilanti, Mich., has been purchased by Charles W. Chapman and Theodore H. Millington, and statement is made that it is their purpose to produce a four-wheel drive tractor that will sell for a moderate price,

CHAMPION COMPANIES AT ODDS OVER SPARK PLUGS.

A petition has been filed in the United States District Court at Detroit by the Champion Spark Plug Co. of Toledo, O., for an injunction restraining the Champion Ignition Co., Flint, Mich., from manufacturing "Champion" spark plugs and for damages claimed to the extent of "\$10,000 and upwards." The same damages are claimed by the defendant corporation in a counter suit in which infringement of patent rights is alleged.

The affidavits filed in the cases set forth that the "Champion" spark plug was invented by Albert Champion of Boston, who, because of financial difficulties, turned over the manufacturing rights to a corporation organized in 1905 by Frank Stranahan, receiving 48 shares of stock in return for his plant. Champion was made manager and the plugs were known as "Champion." Statement is made that \$1,000,000 was expended advertising them. Three years later Champion with-

WOMEN WORKERS BUILD LAUSON TRACTORS.

The works of the John Lauson Manufacturing Co., New Holstein, Wis., are given over very largely to the production of Lauson tractors, although engines and lighting plants and other equipment are turned out. The concern is of large proportions and the town itself is not large, so that there is not the supply of labor that might be available in larger communities.

When the company experienced a shortage of labor it began to employ women, and a considerable number were placed in different departments. Statement is made that whether they were operating drill presses or lathes or assembling tractors, the women did good and efficient work, and while time was necessary for them to develop into mechanics and machine tool operators, there was no doubt of their willingness to learn and of the thoroughness of their work. In fact, the majority of them made surprising prog-



A Group of the Women Workers at the Plant of the John Lauson Manufacturing Co., New Holstein, Wis., Who Replaced Men During the Shortage of Labor, Grouped Around a Lauson Tractor.

drew from the company and organized the Champion Ignition Co., at Flint, producing plugs that were known as "Champion" and later as "A-C" and "Titan" spark plugs. The papers filed by both plaintiff and defendant allege unfair competition and have submitted evidence to the effect that the mails of the company get confused.

WOLVERINE TRACTOR COMPANY ELECTS OFFICERS.

The Wolverine Tractor Co. of Detroit, which has its factory at Saginaw, Mich., has elected the following directors: W. J. Wickles, Arnold Boutel and W. E. Laur of Saginaw, C. A. Bigelow of Bay City and W. G. Wagenhals, W. E. Wood and W. F. Austin of Detroit. The capital is \$300,000 and of this \$175,000 has been paid in and is available for operating.

E. E. Plummer, who was sales manager for the Pacific coast district for the Selden Truck Sales Co. of Rochester, N. Y., has resigned.

ress and manifested much intelligence in work that they had no knowledge of whatever until they donned overalls and went into the plant.

Many of the women come from prosperous rural communities surrounding New Holstein, and not a few of them own cars in which they drive to and from work. The company undertook to make the working conditions as agreeable as possible for the women, the lighting being made as near ideal as practical, the sanitation was perfected, a rest room was provided and equipped, and a matron was engaged to care for the welfare of the employees.

TRENT SUCCEEDS ADAMS WITH COMMON SENSE TRACTOR.

H. W. Adams, formerly secretary and general manager for the Common Sense Gas Tractor Co., Minneapolis, has retired from that position and has been succeeded by L. E. Trent. No statement has been made by Mr. Adams with reference to his future plans.

JACOBY AND BELDEN OVERLAND VICE PRESIDENTS.

Kelly R. Jacoby and Edward H. Belden have been elected vice presidents of the Willys-Overland Co., the former in charge of engineering. Both have been connected with the company for considerable periods. Jacoby was previously general manager of the Miami Cycle and Manufacturing Co., Middletown, O., and went to the Overland company first as director of service. Later he was made assistant sales manager and more recently assistant to C. A. Earl, first vice president. Mr. Belden is known as the inventor of the Belden transmission gearset for automobile vehicles, and after engaging in manufacture of this invention he joined the Packard Motor Car Co. as a body engineer. Two years ago he went to the Overland company as director of its engineering department.

CANCELLATION OF CONTRACTS BY AUTOMOTIVE INDUSTRY.

There is every reason to believe that there will be friendly cooperation in the cancellation of contracts by the War Department and different concerns of the automotive industry. This was practically assured at a conference of the War Industries Board and representatives of upwards of 125 builders of trucks and cars.

According to Hugh Chalmers of the war service committee of the automotive industry the industry itself and the trade representing it will be one of the first to be restored to a peace basis, and, in his opinion, this ought to be realized by June 1.

ALL PLEDGES FOR TRUCK SALES ARE DISCONTINUED.

All manufacturers and dealers in trucks have been relieved of the necessity of exacting pledges from buyers of vehicles that the machines are to be used for essential purposes, and there has been discontinuance of the order by the priorities division of the War Industries Board establishing what industries may be regarded as essential, and to which sales might be made.

WICHITA TRACTOR SHOW TO BE HELD FEB. 18-22.

The annual tractor and thresher show of the Wichita, Kan., Tractor and Thresher Club, the 18th event of the kind, will take place in that city Feb. 18-22 inclusive. This will be one of the principal tractor shows of the western states.

COOKE ADVERTISING MANAGER FOR DENBY TRUCK.

The Denby Motor Truck Co., Detroit, has appointed as its advertising manager Frank S. Cooke, who was for a long time connected with the Detroit Free Press and who is widely known as a writer on sporting subjects.

Willys Optimistic of the Automotive Industry.

According to John N. Willys, head of the Willys-Overland Co., who also controls the Moline Plow Co., builder of Moline tractors, plows and farming implements, and also the principal owner of the New Process Gear Co., Syracuse, N. Y., there is every reason for belief that the coming year will be very prosperous for the automotive industry. He is also greatly interested in the airplane industry as president of the Curtiss Aeroplane and Motor Corporation.

He believes that during the next year there will be very great progress made in airplane production, and that there will be regular passenger service established between America and Europe by hydro-airplanes, which will carry passengers, mails and even express matter.

He is of the opinion that American automobile vehicle manufacturers have a good year ahead of them, as all or nearly all of the vehicle plants will be back to pre-war production by the coming summer, and, if there is endeavor made, can be producing machines to full capacity providing materials can be obtained.

According to his information the plants of his companies at Toledo, O.; Elmira and Pontiac, Mich., ought to be producing to 100 per cent. by early spring. The intention is to complete the munition contracts as early as is possible and increase the output of vehicles as fast as materials can be obtained. A little time will be necessary to make the transition from war to peace production, but there ought to be less disruption than was caused by the conversion from a peace to a war production.

He stated that he expected the Toledo plant to be up to a 75 per cent. production of automobiles by Jan. 1, and arrangements have been made to carry out the conversion with as little interruption as is possible.

The purchase of the controlling interest of the Moline Plow Co. by the Willys-Overland Co. was especially opportune. There will be a tremendous demand for farm tractors, both in the United States and Europe, and the Moline plant is already more than 9000 tractors behind orders. The machinery and tools for building engines are now being installed in the Toledo plant as rapidly as these can be obtained, and the purpose is to make the tractor engine department a regular part of the big Toledo factory.

CHICAGO WILL HAVE AUTO SHOW IN MARCH.

Although there will be no automobile or truck show in Chicago in January of next year under sanction of the National Automobile Chamber of Commerce, a show will be organized by the Chicago Automobile Trade Association, probably in March, or from six weeks to two months later than the usual show. Thomas J. Hayes has been elected secretary for the show.

S. A. E. ANNUAL MEETING TO BE IN NEW YORK, FEB. 4-6.

The annual meeting of the Society of Automobile Engineers, to take place in New York City, Feb. 4-6, will be given over to a general observance of the end of the war, and the sessions generally will be devoted to the consideration of war and post war subjects. One of the features of the meeting will be showing of scenes in which the central figures are men who have been actively engaged in the war with the American and Allied armies, and in connection with these will be statement of activities and personal accomplishments that have not as yet been told of.

There will be consideration of scientific subjects of all kinds relating to the automotive industry, which will include development, thermo-dynamics of internal explosion engines, construction and operation of war tanks, different types of automobiles developed for war and for general use, radial type aeronautic engines, farm and road tractors, and other productions of interest.

The commercial possibilities of recent intensive work with aircraft engines will be dealt with, and the results of observations of the uses made of power trucks will be considered at considerable length. Another subject will be the development of power driven boats for naval patrol service, and still another will be consideration of the perfection of engines for automobile and farm purposes. One of the events of the meeting will be a dinner that will take place the evening of Feb. 6 at the Hotel Astor. There is reason to believe that the sessions will be the largest in point of attendance in the history of the organization.

"ALL-YEAR CAB" PATENTED.

Statement is made by the Kissel Motor Car Co., Hartford, Wis., that letters patent have been granted for the design and construction of the type of motor truck chassis cab produced by that company and which is known as the "All-Year" cab. This cab was first produced about a year ago, and it possesses many qualities which had not been adapted to truck equipment, at least until then. The design appealed to truck owners and users because of its practicality, and believing the value was such that it should be insured exclusively to the company the patents were applied for.

DUPONT MEN JOIN GENERAL MOTORS COMPANIES.

Frank Turner of Wilmington, Del., formerly comptroller for the DuPont company, has been appointed comptroller of the Buick Motor Co., Flint, Mich., and E. W. Proctor, also of Wilmington, has been made assistant treasurer of the same company. Mr. Turner's predecessor, L. L. Ohland, has been sent to a new position in the office of the General Motors Corporation, in New York City, and J. N. Ryan, former assistant treasurer, has resigned.

the tread or side adhering to the mould while curling, causing marks or scars that do not lessen the wearing quality, but detract from the appearance and value in the mind of the average buyer.

Blemished Tires Generally Good.

Such tires are put aside by inspectors. They cannot be sold for standard prices, and there would be considerable loss were the manufacturers to "scrap" and reclaim them, so the factories generally sell these for what may be termed "best offers," the buyers disposing of them after the names of the makers have been removed. There are no guarantees with such tires unless the buyers will assume responsibility for wear. Usually such tires are sold "as is" and truck owners purchasing them expect to pay comparatively lower prices if they are not guaranteed mileage.

Besides what may be classed as "blemished" tires, discontinued styles and sizes and occasionally surplus stock are sold by manufacturers, and the tires are bought by dealers who expect to "job" them. The greater part of these tires are standard from every point of view, but not guaranteed, and are sold without the name and trade marks of the makers. Handling tires that might in trade parlance be termed "seconds" has been engaged in for years, but these had always been sold by dealers who bought from jobbers, and there was no assumption of responsibility and no attempt to afford service.

Demand for Tire Service.

Mathey Bros. believed that by operating a tire service station in connection with their business they would attract more customers, and that they could retain them by fair dealings and insuring full values for the prices paid. This would increase the market for tires. The chief inducement for customers would be the low prices and the character of the service.

While the project to establish a service station was under consideration the company had opportunity to buy a car load of tires, which was taken advantage of. Next a contract was made to take from one of the largest tire companies all overstock, discontinued styles, types, government rejects and blemished stock, and a month later a similar contract was made with another company. Mathey Bros. is now receiving about 600 tires a month from three different factories and the market for these has steadily increased.

Larger Quarters in Boston.

Having insured a certain supply of tires the company removed from Sudbury street to 76 Cummlington street, where a lease was made for sales and stock rooms having a floor area of more than 5000 square feet, and a service station was established that has equipment for handling every type and size of truck tire made. The service station was operated practically continuous, or at least all of the time necessary to meet the requirements of customers, and a campaign was begun to attract business from truck owners within a radius of about 50 miles of Boston. This campaign was very successful and the company determined to establish a branch in Providence. The

patronage at this branch was such that the company next established a branch in New York City at 506-508 West 45th street, and with it an up-to-date day and night service station.

While the fact that the company sells tires at prices that are lower than the market prices for standard makes, types and sizes has attracted buyers, the service to truck owners is intended to afford a very large time economy. Though the condition of tires can be easily observed, the general desire of owners is to obtain the greatest possible mileage and replacement is seldom made until the need is imperative. Renewals ought to be made as a rule before the tires are worn close to the rims because the main protection of the truck mechanism is the cushion between the rims of the wheels and the highways. Where the vehicles are used on smooth surfaces, such as asphalt, there

statement is made that save in rare instances the time for tire changes will be approximately as specified. Such results, however, cannot be obtained save with well trained workers and special equipment.

With reference to service both of the Mathey brothers affirm that this is quite as important as supplying tires. The demountable type of tire was designed so that the owner of the truck could furnish his own service, buying the tire and having it shipped by express, or delivered, and then making the change, but fully 90 per cent. of the owners would drive miles to a station to have a demountable tire removed. On arrival there might be delay from other jobs in waiting. Largely from this reason the demountable tire was not an advantage to the owner.

Economy Necessitates Good Equipment.

Now that the pressed-on type of tire is



Part of the Boston Service Station of Mathey Bros., Inc., Showing the 400-Ton Pressure Capacity Hydraulic Press Used for Demounting and Remounting Tires on Trucks.

is less deterioration than on other surfacings.

Value of Quick Work to Owners.

Few truck owners want tire replacements made during working hours, for this would mean loss of service, and, of course, shrinkage in working time that might be productive. The continuous operation of the Mathey service stations is to do work during hours the machines would ordinarily be idle. But that there shall be as great time economy as is possible during business hours of the day equipment has been installed and methods have been devised for removal and replacement of tires of the pressed on type that are exceedingly attractive to truck owners. For instance, the Mathey shops have records of removing forward wheels, pressing off an old tire and installing a new tire, and remounting the wheel in seven minutes. The same work can be done with rear wheels and dual tires in 45 minutes. This may appear to be extremely rapid work, and

installed by practically all vehicle manufacturers, the truck owner has to consider the possibility of delays, because of work to be done before he can be served. The tires must be removed by hydraulic presses, new tires installed, and the wheels demounted and remounted. Service can only be given by having equipment and men of experience to handle the work. The tire bases may be rusted to the wheel rims and the presses must be of capacity to exert extremely heavy pressure. The men must be trained to do their work systematically and efficiently, as Mr. Mathey puts it, as though the work were for a fire department and the vehicle was needed in the quickest time possible.

Service also depends upon the office force, which must see that the order is supplied the shop from the stock room. Time can be wasted surprisingly unless there is system and organization. The greasing is made without extra charge, as is the examination of the wheels for

alignment and the condition of the axles. Much excessive wear of tires results from misalignment of the wheels and from sprung axles. Assuming a truck equipped with 36 by five-inch dual rear tires and the same size single tires forward. Should one of the rear tires fail generally two new shoes are installed. The one good tire may have several thousands miles wear, but it is generally "junked." The Mathey plan is to tag it with the customer's name and use it on a front wheel when needed. This is a considerable economy, for the used tire may give good service for a long time on a front wheel.

Some Features of "Mathey Service."

There is much to be said of shop equipment and its value to the customer. Truck wheels of largest size weigh as much as 1500 pounds each and two men are needed when using a chain hoist to lift them to the press tables. The Mathey service stations are equipped with means so that one man can handle the heaviest wheels and do it in much less time than two men can do the work. This is a big saving in cost and in time to all customers.

Out of town customers may ship wheels to the company by express and new tires will be installed and the wheels shipped back the same day, the company paying the express charge one way. Or, if there is a tire press in the vicinity of the customer's garage or place of business, tires can be shipped by express to them and local men can install them generally at a cost of \$2 a tire. The company also has a stock of old but strong wheels, and should a wheel be received with a loose hub or otherwise in poor condition, the hub can be removed and placed in one of the stock wheels so that the truck owner can have returned a wheel that will give entirely satisfactory service at a very small cost compared with the purchase of a new wheel.

The Boston branch and service station is in charge of A. Edward Mathey, who has three salesmen in touch with truck owners. The New York branch is managed by F. A. Mathey, who has two outside salesmen, and the Providence branch is directed by C. A. Golden. The company intends to establish branches in Philadelphia and Chicago within a comparatively short time. The present stock carried in the three branches ranges from 7000 to 8000 tires of five different makes.

Much of the success of the company has been due to its consistent advertising to truck owners, and statement is made by it that in its advertising in MOTOR TRUCK it has developed business with customers as far south as Texas and as far west as the State of Washington. This also established the fact that the company has customers in all sections of the country.

A display of power trucks will take place Feb. 24-27 at South Bethlehem, Pa., at a show organized by the Lehigh Valley Auto Shows Co., of which J. L. Elliott is manager. The passenger car show will take place from Feb. 17 to 24.

The Motor Truck Association of Philadelphia, Pa., will hold a show in that city in March.

MORRIS WILL MANAGE BIG EXPORT BUSINESS.

Morris, Russell & Co., Ltd. of London, which has an office at 14 Church street, New York City, manufactures power vehicle parts and accessories and equipment, and distributes these through trade connections and branches in Paris, Moscow, Calcutta, Johannesburg and Sidney. It has planned to represent American manufacturers wherever it does business and to expand its sales organizations in all parts of the world. The belief of the company is that the automotive industry of the United States will resume business as rapidly as is possible, and that as all European manufacturers and dealers and owners will require large volume of parts and materials, its own organization would afford a means of meeting this demand quickly and without preliminary exploitation. The affairs of the company in America are in charge of Capt. A. S. F. Morris, managing director.

PACKARD COMPANY SEEKING FOREIGN TRADE MEN.

With keen realization of the possibilities of foreign trade the Packard Motor Car Co., Detroit, has begun the development of an organization that will be qualified to exploit the markets of other nations, and as rapidly as the service of desirable salesmen can be obtained they will be trained to assist men who are now in the field. The extent of the company's overseas trade campaign has not been stated, but there is reason to believe that it will be in every promising market. This is an example that the farm tractor and implement manufacturers should follow.

PEERLESS TURNING TO CAR AND TRUCK PRODUCTION.

The Peerless Motor Car Co., Cleveland, O., which for a considerable period was working its plant to capacity building trucks for the War Department, and producing various war munitions, expects to have its conversion plan so far advanced by Jan. 1 that it will be able to resume vehicle construction. The company was engaged in war work to 75 per cent. of its production for practically all the time the nation was at war.

DUNN GOES TO MOLINE PLOW CO.'S PLANT.

H. L. Dunn, who was assistant purchasing agent for the Willys-Overland Co. at the Toledo, O., plant, has been transferred to Moline, Ill., where he will be connected with the Moline Plow Co. One of the principal activities of this company is the production of farm tractors.

Up to Dec. 1 a total of 250,201 registration licenses has been issued in the State of Texas, according to the records of the State Highway Commission, this including 3250 motorcycles. The record also shows that 4188 motor vehicle dealers are engaged in business in the state.

WANT PATTERN AND TOOL PLANT AT LOUISVILLE.

Louisville, Ky., has what is known as the "Million Dollar Factory Fund of Louisville," which had been created for the purpose of attracting industrial concerns to that city. Tempton Aubuchon, general manager of the fund, announces that a special committee, composed of representatives of a number of large manufacturing concerns, has been authorized to negotiate with manufacturers of tools, dies, wood and metal patterns, with a view of locating a tool and pattern plant in the Louisville industrial district.

The need of such a concern is acute, statement being made that during the past few years 59 different metal working plants have greatly increased in proportions. The committee is now negotiating with several companies and may induce one to establish itself in Louisville or vicinity.

CONTINENTAL MUSKEGON PLANT BUSY.

Practically no change has been made by the Continental Motors Corporation at its Muskegon plant, which is devoted almost entirely to the production of truck engines, and, according to the officials of the corporation, there is no probability of changes affecting labor at this factory for a considerable time to come, as large domestic orders are to be filled. The cancellation of government orders at the Detroit plant necessitated partial suspension of operations in some departments, but adjustments are now in progress and production will probably be resumed at this factory within a reasonable period.

SEEKING AMERICAN TRADE CONNECTIONS.

J. B. Clarkson of Hope Gibbons Sons & J. B. Clarkson, Ltd., Wellington, New Zealand, wholesale dealer in power vehicles, motorcycles and accessories, with branches at Sidney, Melbourne, Brisbane, Perth, and agencies throughout Australia and New Zealand, is in America for the purpose of making distributor contracts to represent American manufacturers and sales agents in Australia and New Zealand.

WINNINGHAM TO ENGAGE IN AGENCY ADVERTISING.

An advertising agency will shortly be established at 1148 Book Building, Detroit, Mich., by C. C. Winningham, who was formerly with the Hudson Motor Car Co. and for a considerable period was associated with the work of the War Labor Board at Washington. Mr. Winningham is widely known in the industry.

The Baker-R. & L. Co., Cleveland, O., manufacturer of electric trucks and tractors, has engaged R. W. Knowles, formerly chief engineer and factory superintendent of the Electric Products Co., Cleveland, as assistant to John T. Herten, its chief engineer.

Diamond W Trailers New Product of Western Co.

The Western Trailer Co., 1508-12 Holmes street, Kansas City, Mo., announces that it has begun the manufacture of a series of high grade trailer units of both two and four wheel types, which are known by the trade name of "Diamond W." These units are built to have load capacities from 1000 to 30,000 pounds, and can be equipped with whatever type bodies will best serve the purposes of the buyers. The statement of the company is that these trailers are constructed of the best materials obtainable and they are designed to afford service in any working conditions at comparatively small expense.

The company has a large manufacturing plant, equipped with every facility for production, and the purpose is to develop a sales organization in every section of the country. The company states that it can make immediate deliveries, and it has a well organized transportation engineering department that is at the service of its representatives, so that unusual conditions can be dealt with by experts, who will pass upon the facts as presented and advise with reference to the entire installation required or to any phase of service.

The trailers are constructed with frame of five, six and seven-inch channel steel, which are mounted on extra heavy semi-elliptic springs, on axles that are from two to five inches square, and the wheels, which are extra heavy artillery type, are fitted with Timken roller bearings. On the eight, 10, 12 and 15-ton trailer units Dayton steel wheels are used exclusively. The wheels are shod with Firestone, Goodrich or Goodyear tires, either single or dual, to the specification of the buyers. The trailers are exclusively equipped with the Martin rocking spring drawbar fifth wheel.

The company has engaged H. M. Gillespie as assistant to the president and director of sales. Mr. Gillespie has had wide experience, being formerly associated with the White Co., the Racine Battery Co., Racine, Wis. (as assistant manager), and for four years was district sales manager for the Republic Motor Truck Co., and stationed in different sections of the United States. He is widely known to the trade. The chief engineer is H. G. Fluority, for years connected with steel mills at Pittsburgh and at Birmingham, Ala., who is regarded as an expert of commercial uses of steel. The body department is in charge of Peter Nelson as superintendent. Mr. Nelson has had charge of the body building departments of well known passenger car and truck manufacturers, including the Packard Motor Car Co., Nash Motors Co. and General Motors Corporation. One of his specialties has been the creation of exclusive body designs, upon which he owns several patents for passenger bodies, these including designs and fastenings and bracings for car bodies, motor truck tops and cab construction.

CHANGES AT NEW YORK BRANCH OF PACKARD CO.

Numerous changes have been made in the organization of the Packard Motor Car Co. of New York, at New York City. A. C. Harrington, vice president of sales, resigned to take charge of the national truck accounts for the factory and will make his headquarters at the New York office, though not connected with it. H. Bertram Lewis, advertising manager, has been made manager of distribution, and besides directing the carriage, truck used vehicle, custom body and accessory sales, will supervise the advertising and motor transportation departments, the advertising being handled by Charles D. Morse, manager of direct advertising, and William Carl Chapman, manager of publicity.

Frederick H. Miller, formerly of the New York City branch, will manage the districts of Manhattan, Brooklyn, White Plains and Poughkeepsie; David B. Lane, manager of the Newark branch, will manage the New Jersey district, and John D. Evans of Hartford will manage the Hartford, New Haven, New London, Springfield and Pittsfield, Mass., districts. Capt. Ben C. Helm has been made general carriage sales manager for the New York City branch; Edward C. Blake, formerly manager of the White Plains branch, has been made manager of the New York City branch, and W. S. Hagar is manager of the Brooklyn branch. Frederick Cardway, export manager, will locate at the New York branch Jan. 2.

BUILDING TRACK TO TEST MOTOR TRUCKS.

The United Motor Co., Grand Rapids, Mich., is to construct a private track on which to test the trucks it produces. This is the result of complaints made to the city manager that the company was using the streets of the city for truck tests. The company was then building trucks to fill government orders and the recommendation that a city ordinance be passed prohibiting the test of machines in the city was not acted upon. The government contract has been completed and no large trucks will be built before Feb. 1 and the track is expected to be ready by March 1.

PEERLESS COMPANY HAS MANY BIG ORDERS AHEAD.

Statement is made that the Peerless Truck and Motor Co., Cleveland, O., now has a sufficient number of orders to keep its plant running to capacity for a considerable period, this including resumption of production of passenger cars, as well as producing trucks. More of the company's notes are expected to be retired shortly and the stock is in good demand.

The Grant Motor Car Corporation, Cleveland, O., is expected to considerably increase its production of trucks, and will direct special attention toward developing this division of its business.

King Policy Sells Both Trailers and Trucks.

The King Trailer Co., Ann Arbor, Mich., has adopted what is regarded as decided advance in promoting the sale of the units it builds, and this consists of a series of bulletins, each devoted to the use of King trailers with a specific make of truck as tractors. These bulletins are eight pages with colored covers, four of the pages being given over to the trailers and the other four to the make of truck dealt with specifically. The series now consists of 16 bulletins and it will be increased as rapidly as the booklets can be prepared.

Statement is made that numerous requests have been received from dealers that the trucks they sell be included in the series. This is the first time a trailer company has recognized the necessity of showing the dealers how to sell trailers as essential parts of truck equipment. There is belief that the same sales effort will sell both truck and trailer, and the number of prospective buyers is largely increased, for practically every haulage



Specimens of King Trailer Bulletins.

requirement can be afforded.

The trailer company maintains that its market has been undeveloped, but the use of trailers is being better understood and the demand is rapidly increasing, yet there is necessity of showing business men specifically how they may utilize trailers economically. The King company states that it realizes that it is the duty of trailer manufacturers to educate the education of the public, or at least to cooperate with the dealer that his actual sales work is reduced to minimum.

A reasonable number of King bulletins will be sent to any interested dealer without cost, either at request to the company at Ann Arbor or by writing to the factory that builds the truck or trucks he deals in. Dealers who are using the bulletins express themselves as surprised at the sales benefit resulting from the use of this literature. The issuance of the bulletins is but a part of the comprehensive campaign of education by the King company on trailer use, which includes publicity through national mediums, trade publications and direct literature.

HALL TRUCKS BUILT IN FOUR SIZES



Hall Two-Ton Worm Truck Chassis, Equipped with a Power Hoist and an Elevating End-Dump Coal Body, in the Service of the C. F. Eddy Co., Boston, Mass.

MANUFACTURING four different size truck chassis to two designs the Lewis-Hall Iron Works, Detroit, has established a production policy that is believed will insure to buyers extremely high quality and insure the development of the company on basis that will be substantial and enduring from every point of view. The company for years was engaged in the production of structural steel and had a business that was widely known when decision was made to engage in the power vehicle industry. While the officers of the concern were not experienced in truck building they realized that the company must produce what would establish prestige and afford entire satisfaction to buyers, and primarily all depended upon the design of the machines built.

For this reason more than ordinary care was taken in determining the types and sizes of chassis. The company first of all had a large plant, any part of which could be devoted to truck building; it had

ample resources, a thorough organization and exceptional facilities for production. The belief of the officials was that if the designs were proven so far as quality was concerned the company could build to meet whatever demand was developed. Business experience had thoroughly established that whatever development was determined should be on a substantial basis and that expansion should be consistent rather than rapid and unstable.

The determination of the designs was with the object of obtaining what would have qualities that would appeal to the judgment of discriminating buyers. The company had the choice of designing and developing its own constructional units, or selecting from the products of specialists those that were known and recognized as standard in the industry.

Large Cost of Exclusive Qualities.

Building units and parts meant the expenditure of large amounts for designing and developing and a far greater cost in sales promotion to educate buyers to the qualities of the machines. This might have been good policy had the company entered the industry earlier, for although the cost would have been very large, it would have the

advantage of exclusive characteristics that might eventually be extremely valuable, but where competition is unusually keen the inclination of buyers generally is to choose what they know as against what is unknown to them, despite the fact that the latter may be the better from the viewpoint of engineering and production.

There was also another aspect, and that was that any investment made in experiment and development must be capitalized and prorated in the prices established, and this would necessitate market values that were higher as compared with the products of companies that were not compelled to include this preliminary expense in the initial prices. Not only this, there would be a comparatively smaller margin and this would limit the company in all of its activities, both of production and service.

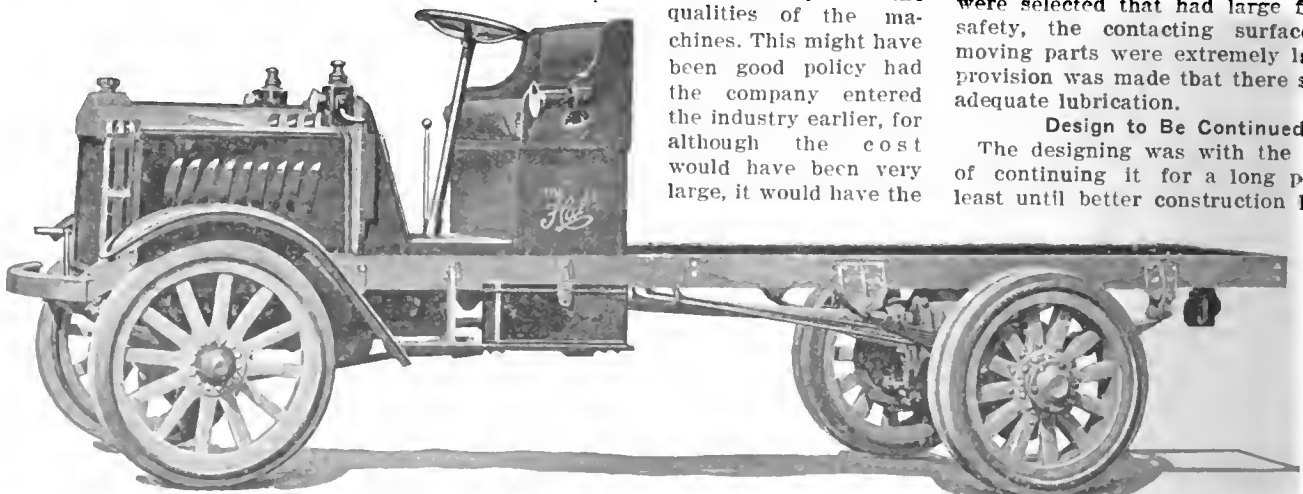
Value of Known Quality Units.

At the other hand there would be a decided advantage in sales and distribution where the units were known, this applying alike to agencies and to their salesmen, and there would be assurance of service from specialists with reference to their products that would have material weight with prospective buyers. The company believed it best to select the units that were built by concerns widely and favorably known and to combine these in a design that would have so far as possible simplicity and accessibility, and which would insure endurance and low operating cost. This necessitated a very careful consideration of different elements and decision was with reference to engineering value, not price or profit.

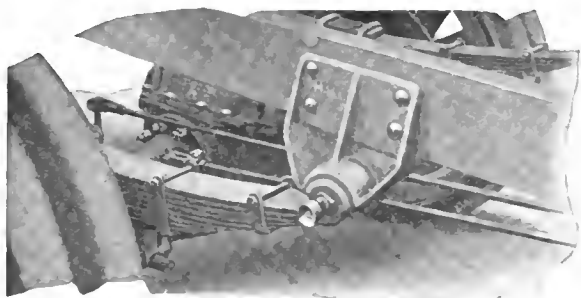
These having been determined assembly was as carefully studied with the object of obtaining strength and endurance. One purpose was to have the smaller parts and fittings of such qualities and designs that the entire design would be "balanced" in strength, that the chassis would endure in any work. The cost of mechanical upkeep was always the determining factor with regard to choice, and wherever experience had taught that there was probability of wear the parts were selected that had large factors of safety, the contacting surfaces of all moving parts were extremely large, and provision was made that there should be adequate lubrication.

Design to Be Continued.

The designing was with the intention of continuing it for a long period—at least until better construction had been



The Hall Two-Ton, Worm-Drive Truck Chassis, with the Standard Equipment, Including Front Bumper, as Supplied to Dealers, Ready for the Installation of the Body.



The Heavy Forward Hanger for the Rear Spring, That Takes the Driving Thrust and Torque, the Drive Being the Hotchkiss System.



The Semi-Elliptic Rear Springs Have Very Slight Arc and Under Load Are Practically Flat.

proven practical and desirable, and not to make changes until the buyers would benefit. This policy had the merit of simplifying the work of the service department, as well as manufacturing. Not only this, the buyers remote from branches or agencies were insured of thorough maintenance by the thorough knowledge of the units of the mechanical departments of service stations and shops, and that there would be no need for specially trained workers to make adjustments and repairs.

The principal units of the original design were Continental engines, Brown-Lipe clutches, Brown-Lipe transmission gearsets, Timken front axles, Timken rear axles, Spicer or Kinsler-Bennett universal joints, Gemmer steering gears, Zenith carburetors, Bosch or Eisemann magnetos, Duplex governors, while the frames and radiator were designed for construction in the shops of the company. All other parts necessary for assembly were made to designs and produced by the shops. The decision was to have this one design serve for all sizes of chassis, differing only in dimensions.

The company has since developed the design of worm driven trucks and has discontinued the building of chain drive chassis, aside from the largest size, but the policy has been unchanged. The worm driven trucks are two, 3½ and five-ton sizes, and the chain driven is rated at 5-7 tons, for the belief of the engineers is that for certain kinds of heavy work this form of power transmission has qualities that recommends itself to buyers, and that there is a sufficient demand for this machine to continue it in production. There has not been development commercially by axle builders of sizes exceeding the five-ton rating, and chain drive is continued where the loads are extremely heavy.

The Continental engines used in Hall trucks are a special type that is known as the Hall-Continental, that for the two-ton truck having cylinder bore of 4½ inches and stroke of 5¼ inches, which is rated by the S. A. E. formula as 27.25 horsepower. This engine will develop 40 horsepower at approximately 1500 revolutions. The engines used for the 3½, five and 5-7-ton trucks have cylinder bores of 4½ inches and strokes of 5¼ inches and are rated as 32.40 horsepower by the same formula, and

will develop 45 horsepower at the same speed.

The engines differ slightly in that the smaller has the cylinders cast in a block and the cylinders of the latter are cast in pairs. The water jackets of both engines are cast integral, the smallest unit with a large detachable head plate with a single outlet, and the larger with a head plate for each pair of cylinders. The crankshaft of the small engine is 2¼ inches diameter and has three journals with a total bearing length of 9¾ inches, with crankpins two inches diameter and 2½ inches length, and the larger has a 2¼-inch crankshaft with three journals, with a total bearing length of 10¾ inches and crankpins three inches length. The crank cases are cast in two sections from high grade aluminum alloy and with forward and rear extensions that house the timing gearsets and the flywheels, and the lower sections are the oil reservoirs.

The Cooling and Lubricating System.

The details of construction of the engines are practically the same throughout, both being cooled by circulations of water forced by centrifugal pumps, and they are lubricated by a combination force feed and splash system, a double vertical plunger pump, driven by eccentrics from the camshaft, forcing the oil through copper tubes direct to the timing gearsets and over the rear main bearings. The excess oil drains to the oil pans and

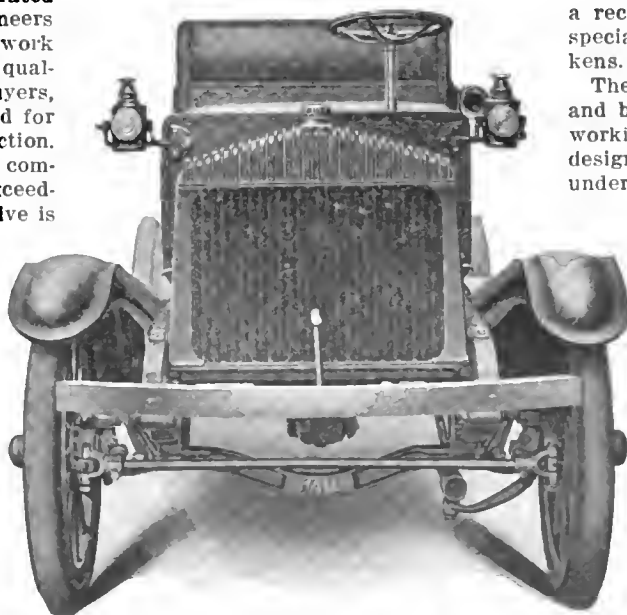
fills the troughs into which the connecting rod big ends sweep, distributing the oil for the cylinders, pistons, wristpins, main and camshaft bearings, cams and valve tappets.

The engines are all equipped with fans mounted on adjustable brackets on annular ball bearings, that are driven by flat belts from the magneto shafts. The regular equipment includes Zenith carburetors, Duplex governors, Bosch or Eisemann magnetos. The engines are mounted at three points, on forward trunnions and on arms carried on the frame side members. The engine of the two-ton chassis is assembled with the Brown-Lipe dry disc clutch and selective sliding gear type transmission gearset, having three forward speed ratios and reverse as a unit plant, but the gearsets of the two larger worm drive chassis, which are located amidships, have four forward speed ratios and reverse.

The drive is by a tubular shaft with a universal joint at either end for the two-ton chassis and a clutch shaft with two universal joints and a main shaft back of the gearset, which is mounted at three points. The transmission gearset and the jackshaft of the 5-7-ton chassis is assembled as a unit, and this is also carried at three points. The worm rear axles are the Timken standard full-floating type, equipped with Timken bearings, and the rear axle of the 5-7-ton trucks are a rectangular section, drop forged from special steel. The front axles are Timkens.

The company constructs its own frames and because of its experience with steel working claim is made that these are so designed and built that they will endure under very heavy loading and in any condition of service.

The two-ton frame is 36 inches wide and of six-inch section, the 3½-ton frame 39 inches wide and six-inch section, and the two large chassis 39 inches wide and seven-inch section. These are mounted on semi-elliptic springs, with especially heavy hangers, bronze bushed eyes and self-lubricating bolts. The company also builds its own radiators, these having cast top and bottom tanks and vertical finned tube cooling sections, and are so designed that repairs are practical and cheap in the event of accident, and there is every protection against stresses from



The Front of the Two-Ton Chassis, Showing the Vertical Finned Tube Cooling Section and Cast Tanks of the Radiator, and the Bumper That Protects.

chassis distortion.

The wheels are wood, artillery type, and are shod with solid hand tires, those of the two-ton chassis being 36 by four forward and 36 by four dual rear; those of the 3½-ton chassis being 36 by five forward and 36 by 5 dual rear; those of the five-ton and the 5-7-ton chassis being 36 by five-inch forward and 40 by six-inch dual rear. The wheelbases are: Two-ton, 156 inches and 58 inch tread; of the 3½-ton chassis, 144 inches regular, with option of 120 or 168 inches, and tread of 65 inches forward and 72 inches rear; of the five-ton and 5-7-ton chassis, 144 inches, with option of 120, 168 or 192 inches, with 66 inch tread forward and 72 inches rear. The control is conventional and the brakes are extremely large, these being double internal expanding on the rear wheels of the worm driven chassis, and on the jackshafts and the rear wheels of the chain driven chassis.

These trucks are sold with standard equipment. Claim is made that though the chassis throughout are oversize as compared with trucks of similar load capacities, they are not heavy with reference to weight.

ANNUAL MEETING OF GOODYEAR STOCKHOLDERS.

The stockholders of the Goodyear Tire and Rubber Co., Akron, O., re-elected all of its directors, the board consisting of F. W. Sieberling, G. M. Stadelman, P. W. Litchfield, F. H. Adams, H. B. Manton and J. P. Loomis. The directors re-elected the following officers: F. A. Sieberling, president and general manager; C. W. Sieberling, vice president and manager of purchases; G. M. Stadelman, vice president and manager of sales; P. W. Litchfield, vice president and factory manager; A. F. Osterich, secretary; W. E. Palmer, treasurer and assistant secretary; H. J. Blackburn, assistant treasurer.

PRICES OF STEEL MAY BE CONSIDERABLY LOWER.

There is belief that the prices of steel will be considerably lower shortly after the first of the year, because the control of the steel industry by the government will end Dec. 31, when the War Industries Board of the Council of National Defense will cease to exist with the approval of President Wilson.

Transport Truck Is Internal Gear Drive Type

The Transport Motor Truck Co., Mount Pleasant, Mich., which was organized last spring, and which was in readiness to operate last July, but was compelled to defer production because of war restrictions and shortage of materials, has begun to manufacture trucks and expects to increase its output quite rapidly.

This concern is headed by Milton A. Holmes, as president and general manager, who is widely known in the power truck industry and has made some remarkable successes in developing sales organizations. He has been associated with some of the largest concerns building trucks and has intimate knowledge of manufacturing and distributing them. In this company he is associated with men of large resources and varied business experience and a plant has been established and thoroughly equipped.

Mr. Holmes decided that development of a design that would embody every quality desired in a truck was essential, and when this had been determined the policy decided on was to standardize this and produce it in large numbers. After building several trucks the period of enforced idleness was used to good advantage to thoroughly test the machines by road work, and the company maintains that it has thoroughly proven the design and established its practical value.

President Holmes states that he has made distributor contracts in many of the commercial centers, and the company has begun production with orders for more than 500 trucks to fill, so that real activity and business is assured.

The chassis the company is producing is rated at 2½ tons load capacity, and it is constructed of thoroughly known units, including Continental engines, equipped with Stromberg carburetors, Duplex governor and Eisemann magnetos, combined with Fuller multiple dry disc clutches and selective sliding gear transmission gearsets in unit power plants; Clark internal gear drive rear axles, Columbia front axles, Jacox steering gears and Prudden wheels. The wheelbase is 150 inches.

The truck is sold with an equipment consisting of driver's seat, running

boards, fenders, oil lamps placed inside the dash and tail lamp, motometer, odometer, jack and a tool kit.

ESTEP, NOTED PUBLICITY MAN, KILLED IN FRANCE.

E. Ralph Estep, formerly editor of Motor Age, advertising manager for the Packard Motor Car Co., and later engaged in advertising and publicity work, was killed Nov. 7 near Sedan, France. Shortly after the beginning of the European war he went to France, Italy and some of the Balkan states as a photographer, and later he returned to this country and served as a camera artist at different cantonments. Later he was commissioned a lieutenant in the army and was sent to France, where he served until the summons on the field of battle. Lieut. Estep was a pioneer of automotive writers and an exceedingly capable man in his profession. He was one of the group who did much to promote the industry. Information of his death was received in this country in a cable to President Macaulay of the Packard company.

RINKE INVENTS GEAR TOOTH INDICATOR.

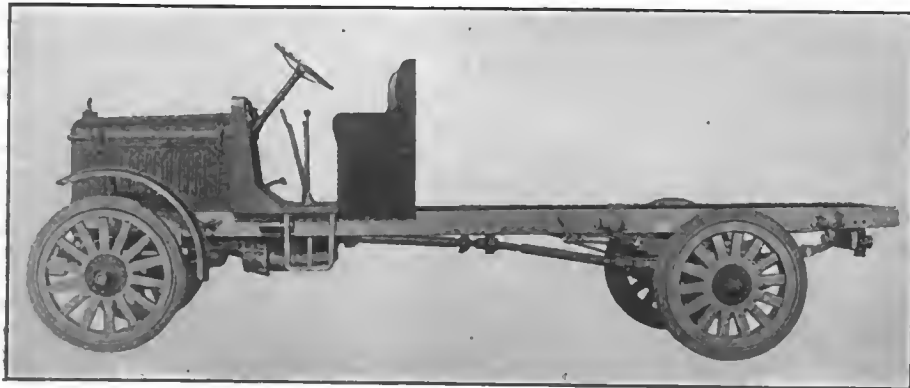
Very broad claims are made for the value of an involute gear tooth indicator invented by Bert Rinke, who was formerly associated with the Hudson Motor Car Co. and the Studebaker Corporation. According to the inventor the instrument will give a direct indicator reading on the curved face of a tooth to .00025 inch, so that engineers on gears can read in a few minutes what would require hours to work out with the old system of using the pantograph. The cost of the device is said to be about a quarter of the pantograph. Mr. Rinke purposes to standardize the spur gears on new cars or machinery with this instrument so that service gears will run positively quiet when cut with a form cutter, hobbed, ground tooth or Fellows system.

MICHIGAN IMPLEMENT DEALERS ELECT OFFICERS.

The Michigan Implement and Vehicle Dealers' Association, at the annual session held at Kalamazoo, elected the following officers: President, J. F. Farmer, Vicksburg; vice president, F. L. Williams, Climax; F. E. Strong, Battle Creek, treasurer; directors, C. L. Glasgow, Nashville; W. L. C. Reid, Jackson; W. O. Barton, Portland; J. F. Hayden, Cassopolis; Charles Meach, Lakeview; F. P. Williams, Smith Creek; Isaac Van Dyke, Zeeland, and Ernest Paul, White Pigeon.

The Jackson-Church-Wilcox Co., Saginaw, Mich., is erecting a large addition to its plant, which will be used for a machine shop and for a power house.

The Hayes Wheel Co., Jackson, Mich., has been awarded a contract for 3120 wheels by the War Department.



Side View of the Transport 2½-Ton Truck Chassis, with the Standard Equipment as Delivered to Customers.

REPUBLIC MOTOR TRUCK CO.'S BIG NOTE ISSUE.

The Republic Motor Truck Co., Alma, Mich., has issued first mortgage and collateral trust seven per cent. serial gold notes to the value of \$3,000,000, due serially from Nov. 1, 1920, to 1923, which were offered from 99½ and interest, yielding about 7¼ per cent. to 98 and interest, yielding about 7½ per cent.

The issue was to reduce floating indebtedness and afford additional capital for expansion. The notes are secured by a first mortgage on all the fixed assets of the Republic Motor Truck Co., and the pledge of the entire common stock of the Torbensen Axle Co. The statement of the company was that the prospect for future business is bright, as the demand for the products of the companies is limited only by ability to increase manufacturing schedules.

DENBY EXPORT OFFICE OPENED AT NEW YORK.

The Denby Motor Truck Co., Detroit, has established an export office in New York City, which has been placed in charge of G. W. Worden, who until the opening of this office directed the exportations from the main office at Detroit. The business had so much increased and there was so much need of representation nearer the principal shipping port of America that the change was made.

SELDEN BUSINESS GROWS.

The board of directors of the Selden Truck Sales Co. has declared a dividend of five per cent. on the first preferred stock, and a quarterly dividend of two per cent., the latter payable to stockholders of record as of Jan. 2, 1919.

Statement is made that the business of the company continues to increase, the shipments of trucks for use in this country for the month ending Dec. 7 being 28 per cent. larger than any month's shipments made in the last two years. The company is planning a campaign for development of business in this country, the details of which will shortly be announced.

The Dearborn Truck Co., with capital of \$5,500,000, to engage in the manufacture of motor trucks, automobiles, etc., has been incorporated at Dover, Del., by C. L. Rimlinger, M. M. Clancy and P. B. Drew.

The Pierce-Arrow Motor Car Co., Buffalo, N. Y., has declared a regular quarterly dividend of two per cent. on preferred stock, payable Jan. 2 to stockholders of record as of Dec. 16.

The Studebaker Corporation has planned to completely reconvert its several plants from war work to passenger car and truck production by March 31.

The General Motors Corporation is rushing the work of converting the Marquette Motor Co.'s plant at Saginaw, Mich., to the construction of tractors.

SOME TRUCK WAR CONTRACTS TO BE COMPLETED.

Because the Postoffice Department has increased the number of power trucks that it proposes to utilize in the collection and distribution of mail from 10,500 to 15,700, there is reason to believe that the contracts made by the War Department, which will eventually turn the trucks over to the Postoffice Department, will be filled by the contractors. These are said to be the Packard Motor Car Co., the Pierce-Arrow Motor Car Co., the Locomobile Co. of America, the Garford Motor Truck Co. and the White Co. The building of these trucks will keep the production departments of these concerns running for varying periods. There is said to be little probability that the War Department will return trucks used by the War Department army in France to this country.

FUEL ADMINISTRATION LIFTS OIL INDUSTRY CONTROL.

Announcement has been made by the United States Fuel Administration that it has asked the oil industry to suspend all voluntary restrictions on crude oil prices and distribution and on refined products. This is regarded as releasing from government supervision all the industry, both crude and refined, which will be permanent unless, according to the statement, "events prove the necessity of again exercising control." The industry is reminded that all licenses now outstanding will remain effective until the President makes proclamation of peace, and that all agreements will continue subject to cancellation or assignment at the request of the fuel administrator. He, however, does not expect to have to exercise this authority.

NO CHANGE IN NASH PRICES.

Announcement is made by President C. W. Nash of the Nash Motors Co., Racine, Wis., that the prices prevailing for Nash trucks will be continued without change until July 1, 1919. These are now: \$1650 for the one-ton truck chassis; \$2175 for the two-ton truck chassis, and \$3250 for the two-ton Nash "Quad" or four-wheel driven truck.

AHLBERG REMADE BEARINGS IN "BENDER SPECIAL."

The utilization of what had been for years regarded as unserviceable and valueless is the foundation of the business of the Ahlberg Bearing Co., Chicago, a concern that restores worn bearings of all kinds so that their service life is practically doubled. These are exchanged for bearings that are useless upon payment of a comparatively small sum, the system of exchange and restoration being continued, so that automobile vehicle owners may obtain what is practically initial efficiency and greatly lengthen the service of their machines for minimum expenditure.

The company has designed what is regarded as one of the most unique passenger cars to be seen in Chicago boulevards that is known as the "Bender Special." This is a roadster that can be driven 70 miles an hour, in which is a Buda four-cylinder engine that is equipped with a high-tension magneto for ignition current. It is equipped with electric lights under the hood and in the tool box and the horn is operated by a foot pedal, as is a fuel supply accelerator. The machine is fitted throughout with Ahlberg remade ball bearings, which demonstrates the mechanical value of the restoration processes of the Ahlberg company.

POWER VEHICLE SHIPMENTS SHOW BIG LOSSES.

The losses through the curtailment of production of the automotive industry are best reflected by the shipments from the factories, which were 6201 carloads in November, as against 18,942 in the same month last year. In October the factories shipped 8214 carloads, as against 21,403 in October of 1917.

GMC PREFERRED STOCK TO BE REDUCED.

The board of directors of the General Motors Corporation has authorized the issue of debenture stock to the value of \$150,000,000, and has also determined that the amount of preferred stock outstanding shall be reduced from \$100,000,000 to \$20,000,000.



The "Bender Special," a Roadster Built at Chicago and Equipped Throughout with Ahlberg Remade Bearings.

Motor Truck Branch Bank for Armies in France.

One of the necessities developed by the European war is, for the American soldiers at least, banking facilities. There is very nearly 2,000,000 men in all branches of the service now abroad, and they are paid by the government. Obviously cash is needed for payment, and yet the difficulty of handling large amounts is such that payment is usually made by checks, which must be cashed.

During the period of actual hostilities prompt payment was not always possible, because when the checks were in readiness the commands could not be mustered, for they could not be withdrawn from service for even a brief period, and there were many reasons why the men did not receive their money promptly. With the cessation of warfare conditions were entirely changed and the Guaranty Trust Co. of New York City, one of the largest banking institutions of America, decided to establish several mobile branches which could be connected with its Paris branch and could be located wherever desired for periods or regular or occasional intervals, affording to the soldiers practically every bank facility that would be essential to their needs.

These branches will be motor truck chassis equipped with bodies designed especially for the service. The company negotiated with the Compagnie Francaise des Etablissements Selden Truck Sales Co., which is the French branch of the Selden company, and after choice of a chassis a body design was determined. The body frame is oak and the panels are sheet steel, and the finish is a light gray. The interior is fitted with office equipment and a small, but very strong safe. The body has two paying windows and an adjustable counter at the rear, these

being about the height of a man's shoulder, so that a customer cannot reach into nor see inside of the body. The Selden company has built 10 vehicles of this type for use in foreign countries.

The expectation is that the banks will be used by United States disbursing officers transporting cash to different camps and posts, and they will also afford banking facilities to the soldiers, for they can cash checks or buy drafts or make deposits, can make exchange of money and can have available the business convenience that obtains with the main bank or its branches.

ACASON TRUCKS NOT CHANGED.

The Acason Motor Truck Co., Detroit, states that there will be practically no change in the units or material entering into the construction of Acason trucks, and that while there have been a number of improvements, these are of minor character. The standard equipment will include the Boyce motometer. The company will paint all chassis shipped from the factory, instead of giving them a priming coat of lead, which will obviate delay in delivery. The load capacities will continue to be 1½, two, 3½ and five tons. In keeping with the general policy of other truck manufacturers there will be no change in prices for six months or more.

WILL SPECIALIZE AUTOMOTIVE EXPORTS.

Specialization of exports to South America, Central America, Mexico and the West Indian Islands will be undertaken by Reed, Tilley & Co., which was recently organized in New York City and has begun business with capital of \$50,000 and will deal principally in tractors, passenger cars, trucks, farm lighting systems, electrical supplies, motorcycles, tires and accessories.

Dearborn Truck Co. Buys Two Smith Companies.

The Dearborn Truck Co., with general offices at 2015-17 South Michigan avenue, and factory at 2515-25 West 35th street, Chicago, has purchased the materials and good will of the Smith Motor Truck Corporation, and the Smith Form-A-Truck Co., both of which had been financially involved, and has combined the business of each under its own name. The Dearborn company maintains that it now has the largest and most efficient service organization ever united—large enough to afford adequate service to more than 50,000 Smith and Dearborn truck conversion units now in use.

The combination of the three concerns has given the Dearborn company a very large stock of materials, it has ample manufacturing facilities, a very large dealers' organization and a service system that is maintained to be exceptionally efficient. The company will continue to produce both trucks and units under the name of Smith and Dearborn—"Smith," and will supply parts of all kinds for the machines now in service. The company will next month begin the production of two new Dearborn trucks, model B, which will be chain driven and have load capacity of two tons, and model H, which will be worm driven and have load capacity of 2½ tons.

The complete series of Dearborn and Dearborn-"Smith" vehicles and units will be as follows:

	Price
Dearborn model F, 1½ tons, worm driven truck.....	\$1980
Dearborn model B, two tons, chain driven truck.....	.....
Dearborn model H, 2½ tons, worm driven truck.....	.....
Smith model A, one ton, chain driven truck.....	975
Dearborn-"Smith" Universal one ton unit.....	450
Dearborn-"Smith" Universal two ton unit.....	550
Dearborn-"Smith" Form-A-Truck unit for Ford chassis, one ton....	400
Dearborn-"Smith" Form-A-Truck unit for Ford chassis, two ton....	500

The Dearborn company is now completing its sales organization and intends to develop this until it has obtained representation in practically every part of the country.

The annual show of the Brooklyn, N. Y., Motor Vehicle Dealers' Association under the management of I. C. Kirkham will have a passenger car display from March 22 to 29 and an exhibition of trucks from April 1 to 5 inclusive.

The Scripps-Booth Corporation, Detroit, has engaged E. G. Gunn, formerly production engineer for the General Motors Corporation, as its chief engineer.



Selden Truck Chassis with Steel Body Designed to Serve as a Mobile Office of the Paris Branch of the Guaranty Trust Co. of New York City, to Afford Bank Facilities for the American Armies in France.



*The Bearing that
Tomorrow's Farmer
will bank on*

WITH every industry of man speeded to meet the needs of a world at war, the quite usual importance of harvests has been multiplied a thousand fold.

Already increased acreage has been sown and other thousands of acres cleared for planting. It is in this huge work that the tractor will come to its own.

Tractors have come to stay. And the character of the work they are to do emphasizes the need for perfect machines. Nothing cheap, nothing flimsy can stand the strain. In gruelling service, day and night, one season upon another, they must stand up.

The wearing parts—where friction is born—will be protected with ball bearings. And they will be dependable bearings of proven efficiency under abnormal service conditions.

It's interesting to know that because of past performance Hess-Bright Ball Bearings are the natural choice for this service. And their reputation and the manner of their making will not fail.

THE HESS-BRIGHT MANU-
FACTURING COMPANY
Philadelphia, Pa.



Where Performance takes Preference over Price

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

(Continued from Page 443.)

Name	Distance	Miles To
Worcester	43.4	43.4
Springfield	94.4	51.0
Hartford	121.7	27.3
Waterbury	152.0	30.3
Canbury	183.8	31.8
New York	245.8	62.8
Jersey City .....	.....	.....
Newark	256.4	10.6
Trenton	311.6	55.2
Philadelphia	351.8	40.2
Baltimore	445.8	94.0
Washington	483.7	37.9

In addition to this the route No. 2 will be continued west from Springfield, going as far west as Buffalo. This will make the principal points between Boston and Buffalo as follows:

Name	Distance	Miles To
Worcester	43.4	43.4
Springfield	94.4	51.0
Pittsfield	150.4	56.0
Albany	187.1	36.7
Utica	281.7	94.6
Syracuse	331.6	49.9
Rochester	414.9	83.3
Buffalo	485.9	71.0

By highway the distances between Boston and Washington and Buffalo are about the same. While these points are not the limitation of service, they have been determined as the furthest that regular transportation will be afforded, at least until the operating organization has been sufficiently increased to justify undertaking regular collection and distribution over so large a territory.

Trucks Operated from Different Bases.

The operating plan of the company differs from those of other concerns in that the trucks are not or will not be all attached to one or two bases, but will be located wherever there is need of a group. That is, in the different commercial and industrial centers where business has been developed will be headquarters from each of which a number of machines will be operated. This will locate the equipment where it can be utilized most productively and the dead or unproductive mileage will be reduced to a minimum.

The operations of the company are directed from the offices at Boston and New York City, there being record kept of the movement of each truck, so that it can be available for whatever work may be necessary along each of the two main routes. When a truck is dispatched from New York City east bound, for instance, the various points of delivery and collection are of record and a machine may be reached by communicating with any of these, according to the time elapsed after departure. While the business has not been so developed that cargoes are dispatched at stated times, that is, as passenger train schedules are made up, the departures are as the loads are collected and approximate times can be given for the dispatch of miscellaneous cargoes, and delivery time can be closely stated. When a single shipment is a truck load definite time for leaving and arrival can be fixed.

Instances of Special Work.

Trucks are not dispatched from Boston to New York, for instances, unless there are full cargoes, though special trips have been made with less than capacity loads to meet the emergency of concerns that value the service sufficiently to pay

the prices demanded. An instance of this happened the present month when a truck was sent from Boston to Salamanca, N. Y., for the Ashworth, Odell Worsted Co., carrying 38 bales of wool, weighing 12,128 pounds, which was valued at \$50,000. From Salamanca the truck proceeded to Buffalo and then returned to Providence with a full freight. The time required for the round trip was nine days, including a day lost by the truck breaking through a bridge while making a detour necessary by highway repairs.

The crew consisted of two men, and the work was arranged so that full night stops were made each alternate night, the men relieving each other driving. By this plan the truck was driven practically 36 of the 48 hours, and while this necessitated sleepless nights, except for such rest as could be had while the truck was moving, the object of the crew was to do the work as quickly as possible, for time economy was an extremely important factor in obtaining truck productiveness. For work of this character a special price was paid that much exceeded the rate that would ordinarily be earned by regular cargo haulage. The delivery was very satisfactorily made, so far as the consignees and shippers were concerned, and this is expected to lead to other similar shipments.

Fish Distribution from Boston.

The company has just engaged in what is undertaken as an experiment, with the expectation that if the service can be made satisfactory it will lead to a very large volume of highway haulage. This is distribution of fish from the Fish Pier at Boston, which is the principal places of fish shipments of the country, to inland points. Until now practically all fish food supplied by Boston to the wholesale and retail dealers outside of Boston has been shipped by freight, this necessitating delivery from the "fish pier," which is the location of the principal cold storage plant of the Fish Exchange, to the freight yards and express companies, which in turn delivered the shipments to destinations, where they were again handled and delivered to the consignees, or deliveries were made by the express companies.

Railroad congestion and causes for delay or retardation of fish shipments resulted in limited buying and much dissatisfaction of fish dealers, whose businesses were greatly affected by the failure to have deliveries made on time. This led to the proposition to distribute fish by truck, making deliveries direct from the "fish pier" to customers, and so much favor was expressed of the plan that arrangement was made with the Owners' Transportation Co. to demonstrate the possibilities of such transportation.

Initial Work in Rhode Island.

The first trial was begun the second week of this month with Providence and other parts of Rhode Island as the territory. The trucks are located at the fish pier late in the afternoon and are dispatched late at night in time to reach Central Falls, Pawtucket and Providence about the time the dealers open their places of business, and two six-ton trucks were assigned for this work. The intention is to arrange the deliveries by routes

so that there will be the least possible delay, and this systematizing and organizing is now progressing. The trucks have thus far more than met expectations, considering the inexperience of the drivers, with routing that was experimental and conditions incidental to beginning a service of this character.

The trips are made daily and development of freighting from these outward points of delivery to Boston, that the mileage shall be as largely as possible productive has been begun. The plan of the Boston wholesale fish men is to develop truck service in every direction from Boston, and where the trucks will afford quicker and more certain delivery than can be made by express or freight shipments. The minimized handling is a large item of economy, for the trucks are loaded at the pier and deliveries are made to customers as early as they require them. The intention of the Owners' Transportation Co. is to so systematize the service that fish distribution can be made as far as is practical. The limit can only be determined by actual work, but there appears to be no reason why it cannot be extended practically all over New England, at least as far as New York City and Albany, and to places in a considerable part of middle and, perhaps, northern New England.

Other Lines of Development.

The company has afforded service for a number of the largest industries and several of the public service corporations of New England, all of this special work where time and certain delivery at specified dates were important factors, with such satisfaction that continuance of patronage is assured, and a number of very large contracts have been or are being executed. One of these is the delivery of 1100 machines from Central Falls, R. I., to Philadelphia. The company has presented its operating plan to the Boston Chamber of Commerce with a statement of facilities for regular and special work, and its methods of safeguarding the interests of shippers, as well as establishing its responsibility in its undertakings, and these have received the attention of its traffic manager, this opening a field for highway haulage that had not previously been exploited or developed.

All Cargoes Fully Insured.

The operating plan of the company is to protect all cargoes in transit against loss of fire, theft or collision by blanket policies, with special protection where the values exceeded the standard of a vehicle under the regular existing policies. The record of shipment consists of a bill of lading and way bill that is made out in quadruplicate, one copy for the office files, a copy that is the driver's receipt to the shipper, the third that is the consignee's receipt to the company, and a fourth that is the consignee's bill of lading receipt.

A daily record is kept at the receiving station that specifies the shippers, the consignees, the weight and nature of the shipments, the values, the amounts of insurance and the other necessary details, the rates and the charges made. These data may be supplied by the shipper or taken from the bills of lading, and a copy

(Continued on Page 472.)

VICTORY!

Liberty and Justice have won, and with hearts filled with joy and thanksgiving, we look forward to an early peace—the peace that alone can satisfy—peace with victory.

While practically every industry deserves its share of credit for the victory which all celebrate, there is a special gratification to the industry that we serve in the noteworthy achievements of the motor truck in the transportation of troops, ammunition and supplies.

As they have served in the work of war, so also will they serve in the work of peace—in the work that still must be done for overseas and in the bigger development of business at home.

There are one hundred and fifteen different motor trucks, representing considerably over half the industry, upon which you will find a Ross Steering Gear as standard equipment. If you know Ross Gears or will investigate their claims for superiority, one of these trucks will be your choice.

Write for catalog and any special information desired.

In buying motor trucks to meet the demands of this after-the-war business, choose for efficiency. Buy a Ross-steered truck, because the enormous bearing surfaces in Ross Steering Gears, together with Ross quality in material and workmanship, guarantee easy steering and with it the highest degree of safety and reliability. At the same time, a Ross Steering Gear stands indirectly for equal quality and efficiency in the entire make-up of the truck.

ROSS GEARS

The Steering Gears
that
Predominate
on
Motor Trucks



ROSS GEAR & TOOL COMPANY, 790 Heath St., Lafayette, Ind.

(When Writing to Advertisers, Please Mention MOTOR TRUCK.)

of this record is forwarded to the destination of the shipment for confirmation and identification of the shipment.

The operating record requires a daily report of each truck, the machines on the road making these by telephone or telegram. At the end of each day the driver makes report which shows the mileage, the fuel and lubricant used, the supplies purchased, the work done and the condition of the machine. At the terminals at Boston and New York the machines are examined and inspected before they leave on long distance hauls, and no truck is allowed to go out unless it is in good operative condition. This is an insurance against delays and expense on the road. As the company operates its own service station the cost of adjustments and repairs are kept to the lowest possible point.

Besides the work that has been specifically dealt with the company is prepared to undertake contract work of all kinds where trucks can be used, and will engage to supply any reasonable number. The company has done a great deal of development work, explaining its services and facilities direct to business men who have transportation needs, and it is expanding very rapidly. The growth of the company is the best indication of the success of cooperative ownership under business management.

WILLYS HEADS NEW PROCESS DIRECTORS.

John N. Willys has been elected chairman of the board of directors of the New Process Gear Co., Syracuse, N. Y., at a meeting at which the resignations of President T. W. Meachams, Vice President T. G. Meachams and Secretary and Assistant Treasurer J. F. S. Meachams were received and accepted. At this meeting Vice President J. Allen Smith was elected president, Vice President James E. Kepperly of the Willys-Overland Co. was elected vice president, and Purchasing Agent G. W. Tapper and C. A. Neracher, formerly chief engineer of the Willys-Overland Co., were elected directors.

REVISED LIST PRICES FOR SELDEN TRUCKS.

The Selden Truck Sales Co., Rochester, N. Y., has announced that on Jan. 1 a revision of prices would be effective on all save two models, which will be as follows:

Model	Capacity	Drive	Chassis In-crease	Price
TXR..	1 -ton	Int. Gear		\$1900
TWL.	1 -ton	Worm		\$2200
JCB..	2 -ton	Int. Gear		\$2750
JWB.	2 -ton	Worm		\$3050
NL...	3½-ton	Worm		\$3850
DL...	5 -ton	Worm		\$5000

"Governors for Tractors and Truck Engines" will be the subject for discussion at the monthly meeting of the Minneapolis Section, Society of Automotive Engineers, at the Hotel Radisson, Minneapolis, Minn., Jan. 8.

GALE IS SALES MANAGER OF COMMERCE TRUCK.

The Commerce Motor Truck Co., Detroit, which for practically all of the war was engaged in producing machines for army service, with the resumption of



Gard Gale, General Sales Manager, Commerce Motor Truck Co., Detroit, Mich.

commercial production announced the appointment of Gard Gale, until recently a member of Eastman & Gale, Indianapolis, Ind., distributor for Commerce trucks and Dort passenger cars in several states as its general sales manager. Statement is made that Mr. Gale's success in developing business with both trucks and cars was the reason for his selection for this work.

HOMER HILTON TO DIRECT OSHKOSH TRUCK SALES.

Homer Hilton, for a number of years connected with different publications devoted to the automotive industry and trade, both in eastern and western territories, and later associated with the western office of one of the leading general



Homer Hilton, Sales Manager, Oshkosh Motor Truck Manufacturing Co., Oshkosh, Wis.

magazines, has been engaged by the Oshkosh Motor Truck Manufacturing Co., Oshkosh, Wis., as sales manager. Mr. Hilton is widely and favorably known to the trade.

The Oshkosh Motor Truck Manufacturing Co. was formerly known as the Wisconsin Duplex Auto Co., and is building a truck driven by four wheels. The first unit to be produced is rated at two tons load capacity, but this will be followed by other sizes if the plans of the company are realized.

RUMOR OF FORD PLANT SALE NOT CONFIRMED.

Statements concerning the future of the big plant of the Ford Motor Co., at Highland Park, Detroit, have been given more or less credence of late, but these have been denied by E. G. Liebold, secretary to Henry Ford, and are seemingly based on the observations of those who have no real knowledge of Mr. Ford's affairs.

One rumor was to the effect that the plant was to be disposed of to the General Motors Corporation, and new factories erected at the River Rouge, close to the big blast furnaces developed by Ford to produce steel direct from iron ore. The property holdings of Mr. Ford on the River Rouge are very large and almost unlimited possibilities obtain for industrial expansion were this contemplated.

Building the Ford plant cost millions, and to replace it at the prices of labor and material today, to say nothing of equipment, would mean an enormous expenditure. There is no reason to believe the rumors, but there may be some basis for them. In any event there is little probability that such a large industrial change will be undertaken until the industry has adjusted itself to what may be regarded as a peace basis.

GMC BUILT VEHICLES FOR WAR WORK WORTH \$13,000,000.

Statement is made that the value of the vehicles built by the General Motors Corporation to fill orders for the government for war purposes totaled more than \$13,000,000. The orders included 7111 army ambulances and 2400 trucks for use at aviation fields or camps, or 9511 machines in all, for which an average of \$1367 was paid. This does not include all of the orders received by the subsidiary companies, and the aggregate of all was probably considerably in excess of the total stated.

WILL SELL REO TRUCKS AND CARS IN BRITISH INDIA.

A. E. Gillespie of Bombay, India, has made contract with the Reo Motor Car Co. by which he will become the sole distributor of Reo trucks and cars in India, and the sales plan determined comprehends the establishment of agencies in 11 of the principal cities of India. Mr. Gillespie proposes to make a hard drive for business and will engage in an extensive advertising campaign.



GRAND CENTRAL TERMINAL, New York, with new 27-story Commodore Hotel on right. An average of 502 trains, 86,668 passengers and 50,000 non-passengers enter and leave this great railroad terminal in a single day.

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MMOTOR VEHICLES are a vital part of Transportation, multiplying man's activities and broadening his efficiency. Their present-day utility is the result of constant improvement in tire building and may be increased or decreased according to the kind of service rendered by the tires.

THE TAXICAB that takes you to the train, the passenger car, the truck with big pneumatics for the long, speedy haul and the giant solid-tired monster for heavy duty work—all of these may be made a better investment by equipping them with Fisk Tires.

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1919 POWER VEHICLE EXHIBITIONS

THOUGH the National Automobile Chamber of Commerce sought to discourage power vehicle exhibitions by determining not to hold shows in New York and Chicago, the members of the different organizations of dealers throughout the country have seemingly been a unit in demanding a continuation of the displays.

The National Automobile Chamber of Commerce is made up of manufacturing interests, undoubtedly informed of the conditions with reference to business, and with very accurate knowledge of the materials market. The readjustment of the different enterprises from war essentials to commercial production are undoubtedly better understood by the industrial interests, and without question the chamber based its determination on what was believed best. The manufacturers want to continue business with the least possible disorganization and desire to maintain their sales organizations intact if this can be done.

At the other hand the dealers who are concerned in preserving their own businesses, who have capital invested and realize that they must do all that is possible to stimulate and promote sales, believe that they should not wait for the manufacturers to approve exhibitions; that the best way of convincing them that business is obtainable is by ordering machines. Were shows abandoned there would be a considerable period, and what is regarded as the best of the year for the sale of vehicles, practically inactive, and though they cannot expect to receive the same support from manufacturers as in previous years with reference to what are known as national shows, these are so few that the dealers as a whole should not be guided by the attitude of the industry.

This aspect was chiefly responsible for the decision of the dealers' associations in New York and Chicago deciding to organize exhibitions and to hold them at later dates than usual. The dates were advanced principally from the fact that the time for organizing was very brief as contrasted with previous years and there was desire to make the shows as large as possible. In some instances the dealers' associations have voted to include tractor departments, believing that there is large interest in agricultural machines and that divisions given over to them would attract many people from considerable distances who would not be sufficiently attracted by either cars or trucks or both.

Considering that hostilities have ceased and that peace has not been declared as yet, and that the different car and truck manufacturers have by no means reconverted their plant to commercial production, there may be some reason to apprehend limitations of output for a considerable period. There may be a scarcity of materials that will affect many of the plants, but there is belief that these possibilities ought not to be considered by the dealers. So far as organization of shows is concerned, men of broad experi-

ence are available in practically every large city, and the conference of show managers held late in November convinced the various associations that there was every reason to believe that no serious obstacles existed so far as holding exhibitions were concerned.

New York Show.

This show will be organized by the New York Automobile Dealers' Association and it will be at Madison Square Garden and the 69th Regiment Armory, a short block distant. From Feb. 1 to 8 inclusive will be a show of passenger cars and accessories and from Feb. 10 to 15 inclusive trucks and truck accessories. The show committee consists of Charles H. Larson, chairman; William C. Poertner, Walter C. Wood, Harry J. DeBear, R. J. Gilmore, H. R. Bliss, William M. Sweet and Charles A. Stewart. Mr. Sweet is chairman of the show committee of the Motor and Accessory Manufacturers, and Mr. Stewart is secretary of the Automobile Dealers' Association. Special balconies are to be built to afford additional exhibition space in Madison Square Garden.

Chicago Show.

The show at Chicago will be held under the management of the show committee of the Chicago Automobile Trade Association, and, as in previous years, at the Coliseum and the First Regiment Armory. The display of passenger cars and accessories will be from Jan. 25 to Feb. 1 inclusive, and from Feb. 3 to Feb. 6 inclusive trucks and truck accessories will be shown. The show will be managed by S. A. Miles, who undertook to do in less than four weeks what had usually taken from two to three months. The show has been sanctioned by the Motor and Accessory Manufacturers. The profits in part will go to the treasury of the association, and will be divided in part with the members of the association, the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers. During the show the annual meeting and banquet of the Motor and Accessory Manufacturers will be held at Chicago, and the National Automobile Dealers' Association will meet Jan. 28 and 29 at the Hotel La Salle.

Boston Show.

The Boston Automobile Dealers' Association and the Boston Commercial Motor Vehicle Association has decided to hold its annual exhibition at Mechanics' building from March 15 to 22 inclusive, and following the usual custom this will be a combination show of passenger cars and trucks. The general arrangement of the departments of the show will be continued. Applications for space have been received very rapidly and General Manager Chester I. Campbell, who has managed every Boston show for 14 years, states there is every reason to believe that the exhibition will be up to the standard of previous years. Because there is no other building available the show must be confined to one building, which necessarily limits both the car and truck departments.

Detroit Show.

The Detroit show will take place from March 1 to 8 and will be at the Cross-town Garage building, which is claimed to be the largest one-floor garage in the world. It will be under the management of H. H. Shuart, and there will be departments for passenger cars, trucks, tractors and accessories of all kinds. Claim is made that this will be the largest and best of the automotive exhibitions held at Detroit and that it will attract visitors from a very large area.

Des Moines Show.

The show at Des Moines, Ia., will take place from Feb. 17 to 22 in the new Ford building, which has 115,000 square feet of floor space on the two floors that will be used. There will be departments for passenger cars, trucks, tractors and accessories.

St. Louis Show.

The show at St. Louis, Mo., will be organized by the St. Louis Automobile Manufacturers' and Dealers' Association and will take place from Feb. 24 to 28, inclusive. The secretary of the association, Robert E. Lee, is manager.

Montreal Show.

A show will be held at Montreal, P. Q., under the management of Thomas C. Kirby, secretary of the Montreal Automobile Trade Association, who has managed all previous exhibitions in that city. It will be at the Victoria rink and will be independent of the association, which decided not to hold a show this year. The show interest was such that Mr. Kirby decided to organize one and it will be in aid of the Montreal Soldiers' Wives League. The date will be April 5 to 12 inclusive.

Columbus, O., Show.

The show at Columbus, O., will be held the week beginning March 3 and in the Memorial building. It will be known as the "Victory Show" and will probably include tractors in addition to passenger cars and trucks. The organization is directed by a committee consisting of A. B. Coates, I. P. Madden and H. K. Dobson, and the show will be managed by W. W. Freeman.

The following dates have been determined (save as indicated) for the exhibitions specified, of which greater detail is not available:

Los Angeles, Cal., Automotive Exposition, Dec. 25-Jan. 1.

Milwaukee, Wis., 11th annual exhibition of the Milwaukee Automobile Dealers, Inc., Auditorium, Bart J. Ruddle, manager, Jan. 24-30.

Albany, N. Y., Albany Automobile Dealers' Association, Armory, Feb. 15-22.

Louisville, Ky., Louisville Auto Dealers' Association, Feb. 15-22.

Newark, N. J., New Jersey Auto Exhibition Co., Claude Holgate, manager, Feb. 15-22.

Minneapolis, Northwestern Automotive Exposition, Overland building, Walter B. Wilmot, manager, Feb. 15-22.

South Bethlehem, Pa., Lehigh Valley Auto Shows Co., J. J. Elliott, manager, passenger cars, Feb. 17-24; trucks, Feb. 24-27.

Kansas City, Mo., Kansas City Motor Dealers' Association, E. E. Peake, manager, Feb. 24-March 1.

Grand Rapids, Mich., Grand Rapids Automobile Business Association, E. T. Conlon, manager, February, date not determined.

Philadelphia, Pa., Philadelphia Automobile Trade Association, A. E. Maltby, manager, passenger car show followed by truck show, March, date not determined.

Buffalo, N. Y., Buffalo Automobile Dealers' Association, March 3-8.

San Francisco, Cal., Motor Car Dealers' Association, G. A. Wahlgreen, manager, March 1-10.

Syracuse, N. Y., Syracuse Automobile Dealers' Association, Harry T. Gardner, manager, March 10-15.

Brooklyn, N. Y., Brooklyn Motor Vehicle Dealers' Association, I. C. Kirkham, manager; passenger cars, March 22-29; trucks, April 1-5.

Trenton, N. J., Trenton Auto Trade Association, John L. Brock, manager, March 17-22.

Great Falls, Mont., Montana Automobile Distributors' Association, March, date not determined.

Pittsburgh, Pa., Automobile Dealers' Association of Pittsburgh, John J. Bell, manager, March, date not determined.

Utica, N. Y., Utica Motor Dealers' Association, W. W. Garrabrant, manager, March, date not determined.

Harrisburg, Pa., Harrisburg Motor Dealers' Association, J. Clyde Myton, manager, date not determined.

Cleveland, O., Cleveland Auto Show Co., Fred H. Caley, manager, March or April, date not determined.

Bridgeport, Conn., City Battalion, B. B. Steiber, manager, date not determined.

Hartford, Conn., Hartford Automobile Dealers' Association, date not determined.

BIGGS NEW STUDEBAKER ADVERTISING MANAGER.

Announcement is made by the Studebaker Corporation, Detroit, that it has appointed Harry A. Biggs general manager for the automobile division of the corporation. Mr. Biggs has been identified with the industry for a considerable period, but his activities have been principally as advertising counsel for the company and he has not been brought in contact with the trade through sales.

CAPT. W. S. PETTIT KILLED IN ACTION.

Capt. W. S. Pettit, who was advertising manager for the Studebaker Corporation and later was sales manager for the Commerce Motor Car Co., Detroit, well known to the automotive industry and trade, is reported to have been killed in action in the Argonne forest in France 24 hours before the signing of the armistice with the German army representatives.

BOYNE TRACTOR A NEW TYPE FOUR-WHEEL DRIVE.

The Traction Engine Co., Boyne City, Mich., was organized to build a new type farm tractor designed by J. O. Heinze, who is general manager of the company. The first machine has been built and is now being tested, and statement is made that it has been found to be extremely serviceable and to have several unique features of construction that are exclusive with this tractor.

The tractor is driven by all four wheels and the power is transmitted to each of the wheels by chains and sprockets from a common driving shaft. The steering gear is an unusual construction, control of movement being obtained through drums on the driving shaft which, through the differential gearset, apply power to either side of the tractor as desired, according to the direction the driver wishes to turn.

STUDEBAKER DEVELOPING PRODUCTION PLANS.

The Studebaker Corporation has developed its production plans considerably and statement is made that these comprehend an output of about 10,000 machines during the next few months. But when materials are available and there is a better basis so far as labor is concerned, the schedule will be revised and prices will be probably lowered. There is reason to believe that the 1919 production will be about 25,000 vehicles, but this is expected to be developed until the output is from 150,000 to 160,000 annually. This, however, cannot be reached until the manufacturing facilities have been considerably increased. The largest output of the company was 65,885 machines, in 1916.

HARRY W. FORD, FORMER SAXON HEAD, DEAD.

Capt. Harry W. Ford, recently discharged as a captain in the Motor Transport Corps, died at New York City a few days since from pneumonia. He was a well known factor for a number of years in the automotive industry. He went from Dayton, O., to Detroit, in 1910, and joined the Chalmers Motor Car Co., and he retired from that concern in 1914 to become president of the Saxon Motor Car Corporation, a company he founded. He resigned from the Saxon corporation in January of this year to become president of the Federal Bond and Mortgage Co.

COOKE SUCCESSOR OF M. C. SEVERANCE.

The Racine Rubber Co., Racine, Wis., has appointed Russell Cooke successor to H. C. Severance, its former sales manager, who recently died suddenly. Mr. Cooke has been connected with the company for six years and a good part of the time was assistant to Mr. Severance and has a thorough knowledge of the company's products, its policies and its customers.

McCONNELL REPRESENTS M. & A. M. AT CAPITAL.

R. M. McConnell, formerly assistant cashier of the National Bank of Commerce at Detroit, is now stationed at Washington as representative of the Motor and Accessory Manufacturers, Inc., in such work as is necessary in the interests of members in matters relative to reconstruction policies, especially those pertaining to cancellation of contracts.

His appointment was made by a committee consisting of Charles E. Thompson, president of the Steel Products Co., Cleveland, O., chairman; Christian Gird, president of the Standard Parts Co., Cleveland, and Alexander W. Copland, president of the Detroit Gear and Machine Co., Detroit. The committee was appointed at a recent meeting of the association to direct and determine for it, so far as possible, all matters relating to war adjustments. Mr. McConnell was for several years associated with the Firestone Tire and Rubber Co.

CLARENCE A. NELSON DIES SUDDENLY.

Clarence A. Nelson, vice president of Nelson Brothers Co., and also associated with Nelson Brothers Truck Co., Saginaw, Mich., died suddenly a few days ago from acute indigestion. Mr. Nelson went to Saginaw in 1911 and engaged in business with his two brothers manufacturing gasoline engines and pump jacks. This business prospered and grew with great rapidity. About a year ago the Nelsons formed the Nelson Brothers Truck Co., and began the manufacture of Jumbo-trucks. Mr. Nelson was well known as a capable business man and he was a large factor in the development of the two concerns.

SMALL OVERLAND CARS WILL BE SPECIALIZED.

One of the results of the reconversion of the plant of the Willys-Overland Co., Toledo, O., to vehicle manufacture, will be the production of the small Overland passenger cars, for which design has been perfected, in very large numbers. The machines will be sold for approximately \$500, unless there is a change in manufacturing plans, and this price will be possible only through standardization of design and building on a scale never before attempted by the Overland company.

INTERNATIONAL MOTOR TRUCK EARNINGS.

Statement is made that the earnings of the International Motor Co., New York City, have increased consistently and that the orders for trucks now on hand will keep the works running to capacity until well into the coming year. Large numbers of Mack trucks have been built for the United States and foreign governments, principally big units, and the smaller machines have been generally produced for commercial distribution.



Actual photographs showing what we believe to be the best part of the unpaved 15 miles stretch

Nothing Stalls A *Wilson*

A Two-Ton Wilson—carrying a One-Ton Wilson—on the celebrated stretch between Unity, Ohio, and Beaver Falls, Pennsylvania, known as the “war road” to the East coast.

Actual measurements of mud in other sections range from 16 to 18 inches in depth.

Seven fleets of Wilson Trucks have mastered this road without assistance of any kind and required no mechanical adjustments after completion of the 680 mile journey.

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